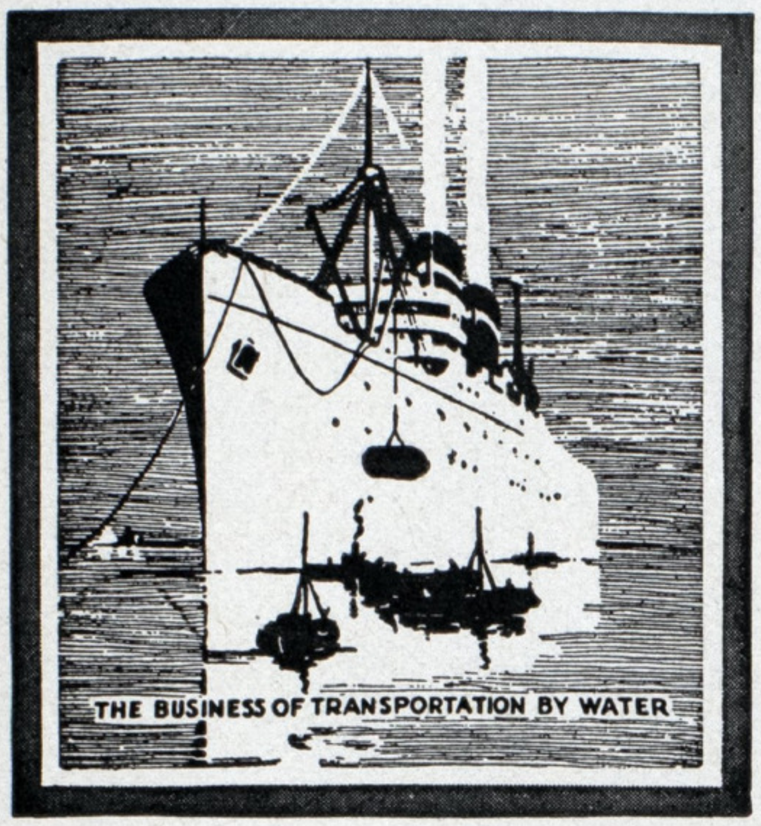
Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND **FOUNDED 1878** **NEW YORK**



Published monthly by
The Penton Publishing Co.
Cleveland, Ohio, U. S. A.

Cleveland Office, Penton Bldg.
A. H. Jansson, *Editor*
H. O. Taylor, *Advertising Manager*

Chicago Office, 1347 Peoples Gas Bldg.
L. C. Pelott
Fred B. Pletcher

New York Office, 220 Broadway,
Joseph Fuller, *Eastern Manager*
E. C. Kreutzberg
B. K. Price
H. R. Simonds

Pittsburgh Office, 507-8 Oliver Bldg.
S. H. Jasper
W. G. Gude

San Francisco Office, 681 Market St.
N. C. Nourse

Washington, D. C. Office,
1020 National Press Building
L. M. Lamm

London Office, Caxton House
Westminster, S. W. 1
Vincent Delport

CONTENTS

Vol. 61 **June 1931** *No. 6*

	Page
Editorial	**19**
Florida, Twin Screw Turbine Liner, Completed	**21**
Passenger Trade on North Atlantic—Part I — By W. L. Harms	**28**
Inland Waterways—Transportation on—Part III — By E. C. Powers	**30**
Unloader Outreach Increased by Installing Thrower — By Deo Dewsen	**37**
Marine Insurance—Ocean and Inland	**39**
New Construction Ordered and Contemplated	**40**
Bunker Prices, Domestic and Foreign	**43**
Maritime Law—Late Decisions — By Harry Bowne Skillman	**44**
Ports—Marine Business Statistics Condensed	**45**
Stevedoring and Dock Management Progress	**46**
Improved Cargo Handling in Meeting Competition	
Fibreboard Packing Cases for Export Shipments — By Capt. Kristen Tvede	
Handling Costs on Ocean Dock (Seattle) — By Robert C. Hill	
Useful Hints on Cargo Handling	**51**
Iron and Steel Used in Shipbuilding	**53**
Personal Sketches of Marine Men	**54**
Capt. Patrick Francis Donnelly, Isthmian S. S. Co. — By Ben K. Price	
Specifications for Welding Determined	**58**
Equipment Used Afloat and Ashore	**60**

MARINE REVIEW is a member of the Audit Bureau of Circulations, Associated Business Papers Inc. and the National Publishers Association. Entered at the Post Office at Cleveland, Ohio, as Second Class Matter, under the act of March 3, 1879.

Copyright 1931 by The Penton Publishing Co., Cleveland, O.

Subscription United States and its possessions, $3 per year; Canada $4.00; Great Britain and other Foreign Countries, £1:0:0. Single copies 35 cents. Back numbers over three months 50 cents. Cable addresses: Penton, Cleveland, and Irotrapen, London.

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products.

VOL. 61 NO.

Marine Review

The National Publication Covering the Business of Transportation by Water

August, 1931

S. S. President Hoover

and S. S. President Coolidge

TO BE FEATURED IN

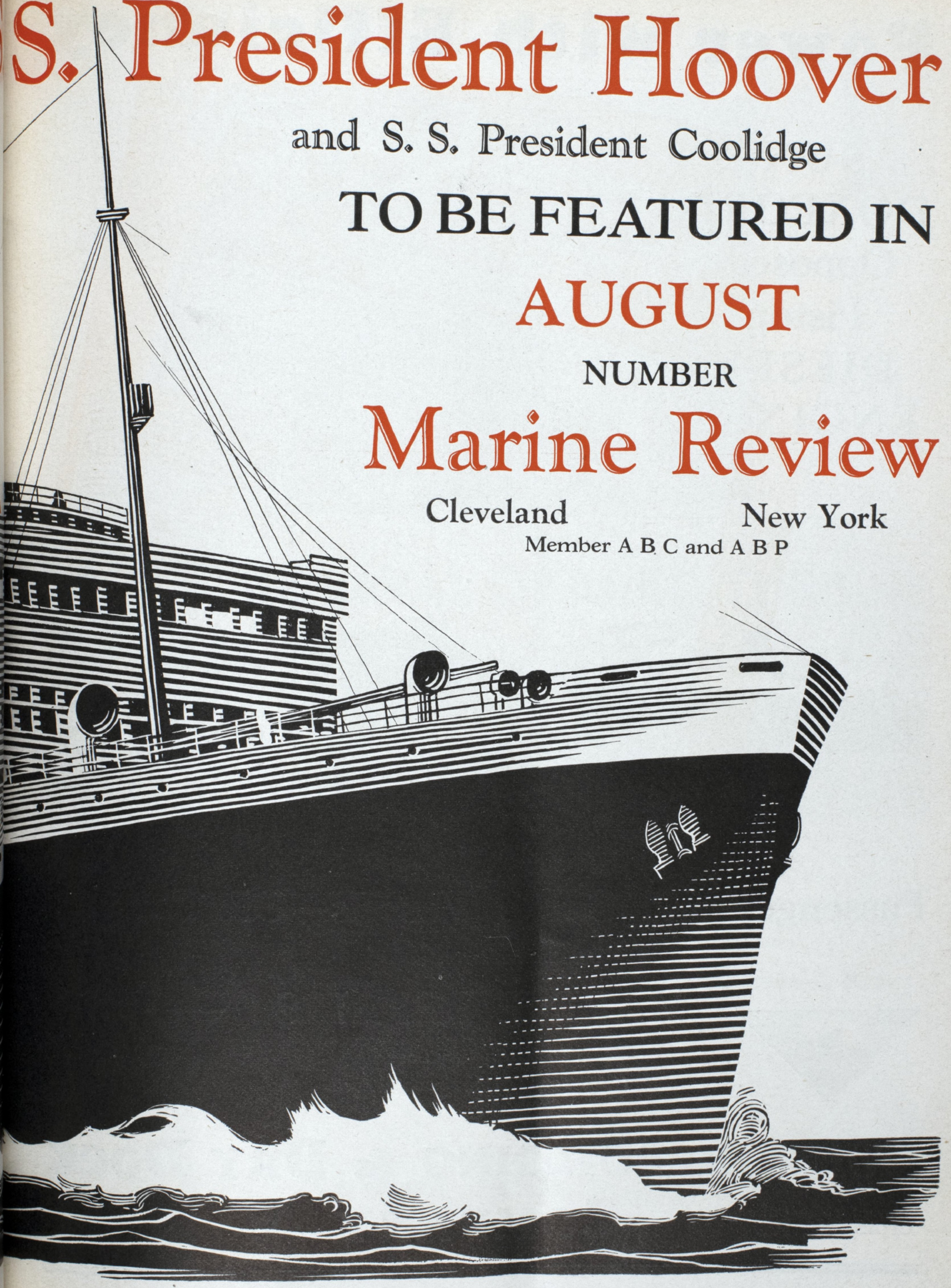
AUGUST

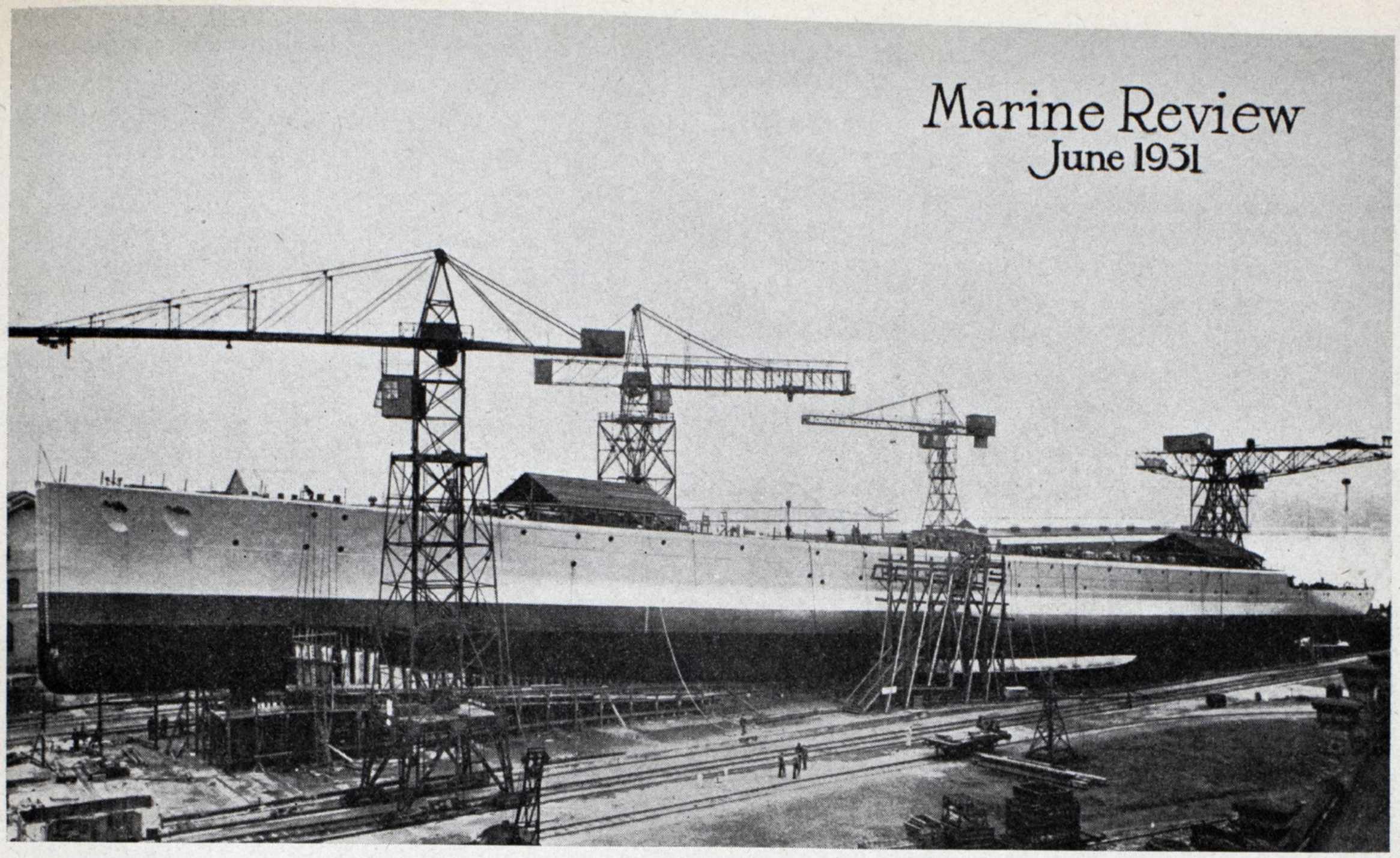
NUMBER

Marine Review

Cleveland New York

Member A B C and A B P





Germany's new Warship known as "Pocket Battleship A," on the stocks at Kiel shortly before her launching May 19. Christened "Deutschland" by President von Hindenburg, the new vessel incorporates many novel features of construction

« EDITORIAL »

Build American Liners for Transatlantic Trade

THE North Atlantic is a proving ground for seamanship and naval architecture. With the old world of historic achievement and traditions on one side and the rich promised land of America on the other, it has come to require the greatest ferry in the world. As the number, wealth and critical discrimination of travelers have increased, competition has compelled the lines engaged in this trade again and again to demonstrate their courage and initiative in demanding from the naval architect and shipbuilder, always larger, faster and more luxurious vessels for this famous service.

Perhaps it is difficult to realize, now when we have fallen to such a comparatively insignicant estate, that the time was when the early Atlantic liners, renowned for their seagoing qualities, were all American. In an article in this issue on the passenger trade of the North Atlantic, it is made clear that American sailing packets had the transatlantic area to themselves until the latter years of the decade of 1830, and that the British then entered the field with steam. From this misadventure the United States never recovered in the North Atlantic.

Not only economic, but traditional incentives as a great nation, furnishing against all of Europe at least half the traffic, thus impel us to again re-enter this arena with winning ships. How can Americans continue indifferent to a reasonable share of this business for ships under the American flag. If we listen it is easy to fall in with a counsel of despair, to believe that the difficulties are insurmountable and somehow or other that we are not skilled in operating ships, that we are notoriously inefficient and extravagant in this one business, though we may be credited with the highest efficiency in every other line of endeavor.

According to one British critic, our entire program in building up our merchant marine is based on a policy of "spoon feeding." If it is "spoon feeding," it is certainly nothing new in the merchant marine policies of other na-

tions, including Britain herself. The transatlantic record for speed, held by the Germans from 1897 to 1907 was not broken until the British government, not only encouraged financially, but pointedly suggested that the Cunard line do something about regaining the blue ribbon of the Atlantic. Similar support and encouragement should be forthcoming from our own government and until it is, it will be futile to hold the United States lines to the letter of its contract.

Excursions and Week-end Trips Afloat

WEEK-END cruises and "capsule holidays" are the clever catch phrases used by foreign lines maintaining services to New York to tap a deep and rich reservoir of new business. The Cunard line has initiated week-end cruises for $50 and up on such a noted vessel as the MAURETANIA, for instance, and from all reports the success of the new venture was immediate and highly satisfactory.

To begin with, the idea of week-end cruises centered on the proposition of educating a wide range of people to the benefits and pleasure of traveling on the sea by providing them with an adequate sample. In operation the plan worked out even better than expected. The cruise was quickly sold out. It was repeated with the same results and is being continued.

Criticism has been directed against the Cunard line for instituting these week-end cruises on the basis that they are, in effect, violations of the coastwise law which does not permit a foreign flag ship to trade between American ports, the contention being that the Cunard line is virtually sailing coastwise from New York with a nominal call at a foreign port and return to New York.

The French line, tapping the same rich American reservoir, advertises a "capsule holiday" in "France afloat" in a cruise on the S. S. PARIS, for six days, at a minimum fare of $75. This voyage will be from New York to Bermuda, to Halifax and return to New York.

Unfortunately, the present condition of our merchant marine is such that practically no American shipping company possesses any vessel comparable to those used in these special trips by the Cunard and French line. Such new ships as have been built are scheduled for liner service on such a basis that they cannot be withdrawn so readily for special cruises.

The program of American shipbuilding brought about by the merchant marine act of 1928 is only a beginning. Beyond this, with every aid and encouragement the government can give, private American enterprise will sooner or later take steps, by providing adequate ships, to at least share in the business which originates in our own country.

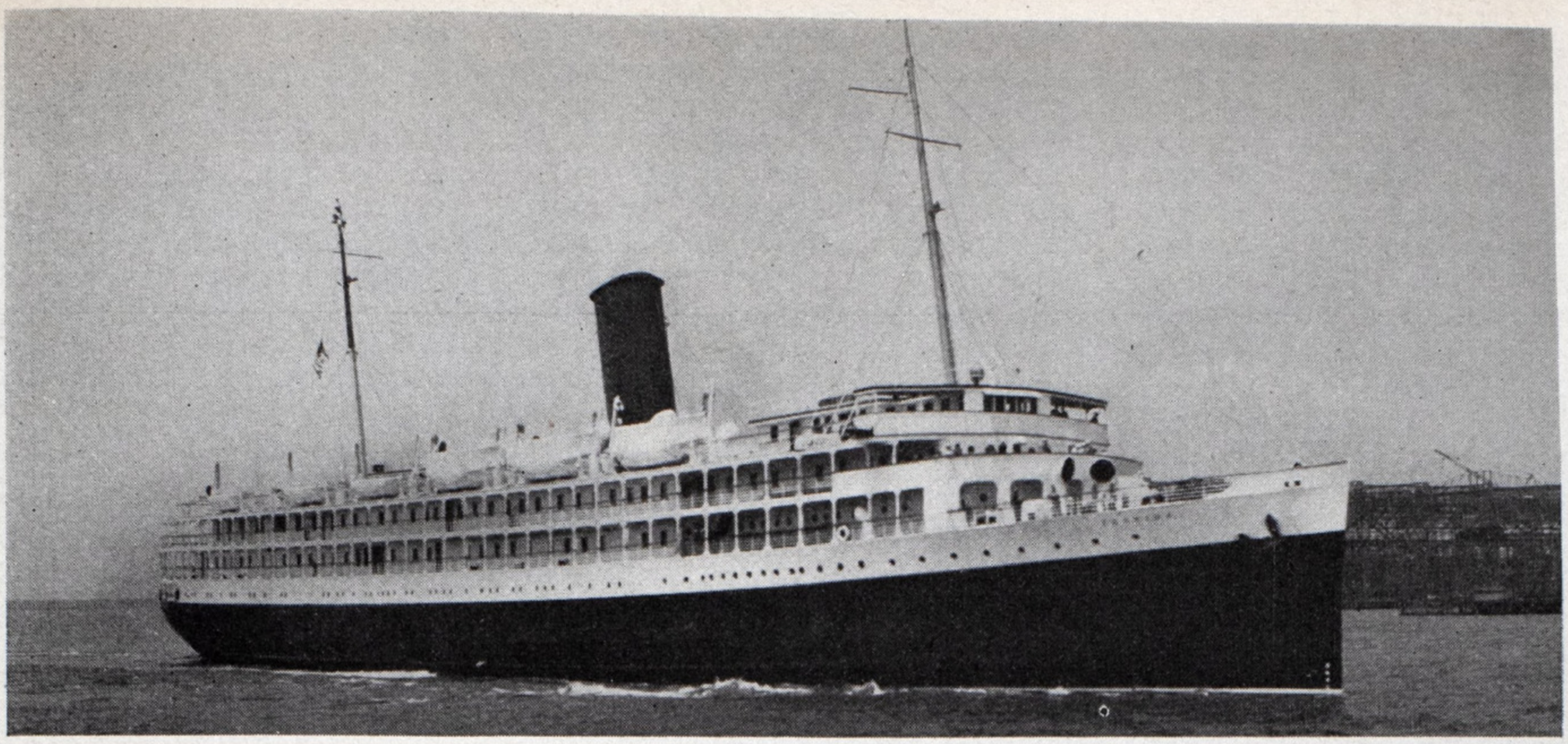
Classification of Pleasure Craft

YEAR by year our own classification society, the American Bureau of Shipping, has gained in strength and prestige. Responsibility entailed in the classification and inspection of the large program of new shipbuilding now going on has been met in so thorough a manner as to merit the respect of all fair-minded shipbuilders, naval architects and shipowners. Government certificates of seaworthiness must depend, and are based largely on the confidence created by classification.

It is therefore interesting to learn that it is proposed to expand the technical staff of the bureau to include a division for classification of pleasure boats. In this way the technical services of its representatives will be available to yards building yachts and motor boats. The bureau has already supervised the construction principles of some of the larger seagoing yachts, such as the new CORSAIR and the LYNDONIA. Recognition has also been accorded to the bureau by the New York Yacht club in certifying the construction of yachts built under the rules of the club.

Under the leadership, first of the late Stevenson Taylor and now Capt. C. A. McAllister, the bureau has strengthened its technical staff by adding men highly trained in the theory of naval architecture and marine engineering as well as in its practical application. The function of the bureau will be to examine plans, recommend practices and supervise tests as a neutral organization. Long experience in work of a similar nature for commercial vessels will thus be brought to bear in the building of pleasure craft and will equally benefit the builders and owners. The bureau, far from taking an arbitrary stand will work out regulations for construction in agreement with the designers, builders and underwriters.

The entry of the American Bureau into this field will safeguard the interests of the many qualified manufacturers of high reputation against the claims of equality for inferior products built by those not qualified nor scrupulous. The bureau is to be commended for taking this step as it is bound to add to orderly procedure, which after all is the very foundation of civilized progress.



Florida Completes Trial Runs

Liner Enters Key West—Havana Service

THE Newport News Shipbuilding & Dry Dock Co. has completed, at the yard in Newport News, and delivered to the Peninsular & Occidental Steamship Co., on May 20, the steamship FLORIDA for service between Florida ports and Havana. This vessel while of the familiar type of American passenger and freight steamships for coastwise service embodies a number of features which to some extent distinguish it from the majority of vessels of that type. One of these is a slightly curved stem, and another is a semicircular type of stern, the combination of which with two raked well pole masts and one stack make a very handsome appearing vessel, as is well illustrated by the accompanying photographs.

Another feature, which although fitted on a few similar type vessels built in the United States in recent years is not very common in mercantile vessels, is a bulbous bow. Still other features are compliance with the requirements of the 1929 safety at sea convention for such matters as watertight subdivision and doors, fire screen bulkheads, locked airports, etc., although the convention rules do not apply to vessels in this service. Also, in line with the best modern practice, is a streamlined balanced rudder.

The construction of the FLORIDA was supervised by Carroll S. Smith, consulting engineer for the owner and his staff, and they also prepared the general design. The lines of the vessel and all details were prepared by the Newport News Shipbuilding & Dry Dock Co. to meet the contract guarantees for speed and fuel consumption. She was built under the special survey of the American Bureau of Shipping to class A. 1. "with freeboard," and in many respects exceeds the requirements as well as those of the United States steamboat inspection service.

The vessel, which is of the complete superstructure type, is twin screw with the shafts carried in partial bossings and struts. There are three steel decks in the hull proper, a promenade deck extending the full length of the vessel, and saloon and boat decks above. With the exception of a short distance at the extreme after end the main framing and steel sides are carried up to the promenade deck. There are long steel deck houses on the promenade and saloon decks, enclosing passenger accommodations, and on the boat deck two smaller wood houses, one containing the wheel and chart room, captain's and officers' quarters, and the other, the radio room, emergency lighting room, and stair hall to passenger accommodations on the decks below.

A complete double bottom, subdivided into compartments for the carriage of fuel oil and boiler feed water, extends from peak to peak, and seven watertight transverse bulkheads provide ample subdivision. The collision bulkhead extends to the promenade deck and all other main division bulkheads extend to the upper deck. Additional fuel oil capacity is provided in tanks built at each side of the boiler room. Outboard of the shaft tunnels, and aft of the refrigerating machinery room between the shaft tunnels, are fresh water tanks for ship's use.

The midship section of the vessel is built with transverse framing, the frames, except at the extreme ends, being channels, joggled. Beams for all decks, up to and including the promenade deck, are also channels fitted on every frame; for the saloon and boat decks, angle beams fitted. A calked Oregon pine deck with teak margins is fitted at the after end of the upper deck, and outside of the houses on the promenade and saloon decks. The boat deck is a tongued and grooved joiner deck, canvas covered over felt. An expansion joint is fitted, about amidships, in the boat deck and the sides of the saloon

Twin Screw S.S. Florida

General Particulars

Owner	Peninsular & Occidental S.S. Co.
Builder	Newport News Shipbuilding & D. D. Co.
Keel Laid	Sept. 2, 1930
Launched	March 7, 1931
Delivered	May 20, 1931
Classification	American Bureau of Shipping
Length overall, feet, inches	387 8
Length on load waterline, feet, inches	378 0
Length between perpendiculars, ft. in.	365 0
Beam, molded, feet, inches	56 6
Depth, molded, to promenade deck, ft. ins.	37 6
Depth, molded, to upper deck, feet, inches	28 6
Draft for scantlings, feet, inches	20 0
Designed load draft, molded, feet, inches	18 9
Displacement at load draft (tons)	6200
Cargo capacity, (cubic feet)	83700
Fuel oil capacity, tons	700
Fresh water capacity, tons	530
Passenger accommodations, first class	612
Passenger accommodations, second class	130
Total persons on board	900
Gross tonnage	4923
Net tonnage	2698
Speed, knots	21¼

deck house, to relieve the structure.

Transportation of passengers is the principal service of the vessel and at certain seasons of the year the passenger traffic is heavy. The usual run will be between Key West and Havana and is therefore a comparatively short one, which requires a steamship having a large amount of open deck space in addition to sleeping accommodation for a considerable number of passengers. The passenger staterooms are located on four different decks and provide accommodations for 612 first class in 222 rooms. Of the latter 22 are on the main deck, 63 on the upper deck, 78 on the promenade and 59 on the saloon deck. Several of the rooms on the upper, promenade and saloon decks each have a private toilet and shower or bath, there being 22 suites and two special rooms of that type. Of the suite rooms 16 have double beds and six have two single beds. In all of these rooms there is also a sofa berth, and some rooms also have Pullman berths.

Of the entire number of passenger staterooms only 16 are inside rooms and of these, two have natural light and air from a skylight directly over them. All other rooms have either windows or airports; the suite rooms have not less than two in each room, and some have three. Only in the amidships part of the upper deck are the staterooms two deep, and these are of the "Bibby" type, with an al-

Twin Screw Steamship Florida—Auxiliaries and Equipment

Boilers and Auxiliaries

Four Babcock & Wilcox watertube boilers in one fire room—Steam supplied at 250 pounds working pressure and saturated steam. Total heating surface, 28,760 square feet. Boilers arranged facing a common fore and aft firing aisle. Amount of feed and level of water in boilers controlled by Babcock & Wilcox float type feed water regulators. Furnaces lines with No. 80 B. & W. firebrick and special insulation to permit operation at continued high ratings.

Oil Fired—Each boiler fitted with 6 Todd oil burners for operation under forced draft. Oil heated in Todd fuel oil heaters.

Forced Draft—Two Sturtevant steam engine driven fans, each with a capacity of 35,000 cubic feet of air per minute.

Soot Blowers—Diamond Power Specialty, automatic valve in head type soot blowers consisting of 4—1½-inch calorized and 6—1½ plain units.

Feed Water Heater—Reilly, two-pass, for single stage feed heating.

Evaporator—Reilly—30 tons capacity.

Gages—Consolidated Ashcroft Hancock Co., Inc. pressure and vacuum gages. Ten 8½-inch dial; seven 4½-inch dial; one standard test gage from zero to 500 pounds for main boilers.

Ejectors—Two—No. 3 model C,H-D Hancock ejectors.

Reducing Valves—For steam pressure reduction and pump regulators by Leslie Co.

Drainer—Cochrane multiport drainer No. 3, handling 20,000 pounds of condensate per hour.

Engine Room Auxiliaries

Auxiliary Turbo Generators—Three Westinghouse 75 kilowatts, lighting sets.

Auxiliary Generator, Emergency—One 5 K.W. Kilby gasoline driven generating set.

Motor Generator—One 10 K.W. Diehl Mfg. Co. Cutler-Hammer controls.

Electric Motors—Diehl Mfg. Co.

Batteries—One 60-cell Exide marine battery for radio and emergency lighting. Two sets of 12-cell Exide batteries used for intercommunication system. Batteries furnished by The Electric Storage Battery Co.

Fresh Water Heater—One, Davis Engineering Corp.

Pumps and Services

Two Main Air, 12 x 30 x 21 inches, vertical twin.

One Main Feed, 18 x 12 x 24 inches, vertical single.

One Auxiliary Feed, 18 x 12 x 24 inches, vertical single.

One Auxiliary Air, 7½ x 14 x 12 inches, vertical single.

One Fire and General Service, 14 x 11 x 12 inches, vertical duplex.

One Ballast Pump, 12 x 14 x 12 inches, vertical single.

One Bilge Pump, 12 x 14 x 12 inches, vertical single.

One Fuel Oil Transfer, 12 x 8 x 12 inches, vertical single.

Two Fuel Oil Service, 10 x 5 x 12 inches, vertical single.

Three Lubricating Oil, 8 x 10 x 12 inches, vertical single.

Two Fresh Water, 6 x 7 x 8 inches, vertical single.

One Hot Fresh Water, 6 x 7 x 8 inches, vertical single.

One Drinking Water, 4½ x 5 x 6 inches, vertical single.

One Evaporator Feed, 5¼ x 4¾ x 5 inches, horizontal duplex.

One Ice Machine Circulating, 6 x 7 x 12 inches, vertical single.

One Brine Circulating, 6 x 7 x 12 inches, vertical single.

Two Circulating, 3-inch single stage centrifugal.

Three Lubricating Oil Pumps, 3 x 2 x 3 inches horizontal duplex, supplied with the turbo generating units.

All the foregoing pumps were furnished by the Warren Steam Pump Co.

Ventilation and Refrigeration

Ventilating Fans—Twelve for supply air and 4 for exhaust supplied by Diehl Mfg. Co. Sturtevant fans driven by Diehl motors, with Cutler-Hammer controls. Each stateroom is also fitted, as are other public spaces, with electric oscillating fans with Diehl motors.

Refrigeration—Ammonia compression system, supplied by I. P. Morris & De LaVergne, Inc. Refrigeration is provided for the following spaces, Meat box, 690 cubic feet; fruit and vegetable box, 250 cubic feet; fish box, 60 cubic feet; chill room, 360 cubic feet; ice storage, 233 cubic feet; dairy, 38 cubic feet; pantry box, 60 cubic feet; beverage box, 50 cubic feet; also to cool drinking water in a 160 gallon scuttle butt and to make 400 pounds of ice per day.

Safety Equipment

Fire Protection—Cargo spaces equipped with Lux CO. system, 52 cylinders. This battery is also used to provide gas for extinguishing in the two automobile spaces and in boiler room. A Lux hose reel with two separate cylinders of gas is also installed in boiler room.

Fire Alarm—Garrison Fire Detecting System.

Navigating Outfit—T. S. & J. D. Negus.

Anchor Chain—Cast steel stud link, 270 fathoms, 2⅛-inch wire diameter. National Malleable & Steel Castings Co.

Life Boats—Seventeen, 26-foot, 50-person steel keel, copper bearing galvanized steel, metallic lifeboats; and one 26-foot 40-person, motor lifeboat with 10-12 H.P. Palmer engine. All supplied by Welin Davit & Boat Corp.

Mechanical Davits—Twelve sets of Steward mechanical davits for handling lifeboats referred to above, to have clear outreach of seven feet and high enough to allow boats to be stowed nested. Supplied by Steward Davit & Equipment Corp.

Signalling—Mechanical engine and docking telegraph system; electric rudder indicator system; loud speaking telephone system. All furnished by Chas. J. Henschel & Co., Inc.

Revolution Counters—Two combination counter and telltale, Cummings Machine Works.

Search Lights—One 18-inch pilot house incandescent and one 18-inch pedestal type high intensity arc. Both supplied by Sperry Gyroscope Co.

Watertight Door System—Horizontal and vertical watertight bulkhead doors below decks, operated by Newport News-Cutler-Hammer controls. Quick and positive action of the doors in any crisis.

Boat Winches—Two, American Engineering Co., each driven by one 10 horsepower, 115 volt, waterproof Diehl motor with Cutler-Hammer brakes and controls.

Engine Direction & Rev. Indicators—Alexander McNab.

Miscellaneous Equipment

Reduction Gears—Two sets for main turbines, rated at 4750 H.P. maximum; pitch diameter of pinions, 9.2 inches, pitch diameter of the gear, 105 inches; width of working face, 38 inches; helical angle, 45 degrees. A Kingsbury thrust bearing is located at the forward end of each gear.

Windlass—Horizontal spur gear, steam, American Engineering Co. Two wildcats for 2⅛ inch stud link chain; two 20-inch warping heads. Chain stoppers.

Steering Gear—Steam, 10 x 10 inches, right and left hand screws; American Engineering Co. Steering stand and hand steering gear on the promenade deck aft, also supplied by the same company.

Steam Gypsies—Two, 20-inch diameter, driven by an 8 x 8 inches double cylinder reversible horizontal steam engines. American Engineering Co.

Elevators—Two for handling cargo, one for handling automobiles and cargo, supplied by M. L. Bayard & Co. The two general cargo and stores elevator, each have a capacity of 3000 pounds at 90 feet per minute. The car for No. 1 elevator is 6 x 7 feet and the other 7 x 7 feet. Each elevator is operated by 25 H.P., 115 volt, totally enclosed, Diehl motors with Cutler-Hammer control equipment. The remaining elevator has a capacity of 6000 pounds at 90 feet per minute with a car 18 feet by 9 feet 6 inches for handling automobiles and general cargo. This elevator also furnished by M. L. Bayard & Co. is driven through worm gear reduction by two 45 H.P. Diehl motors, one on either side, one being for regular use and one for standby. The controls for these motors are Cutler-Hammer.

Machine Shop—Line shafting, driven by 5 H.P. Diehl motor with Cutler-Hammer control.

Marine Clock—Brass case, 8½-inch dial—Ashcroft American.

Clock Equipment—Generally throughout the ship, eight-day clocks, Chelsea Clock Co.

Lighting Fixtures—Furnished in part by Cox, Nostrand & Gunnison.

Tank Gages—Eleven, Pneumercator gages for the fuel oil tanks indicating the amount of oil in each tank in feet and inches and in gallons.

Condenser Tubes—Admiralty metal, ¾ inch o.d. No. 16 B.w.g. In quantities 6670, 10 feet 3 inches long for the main condensers and 100 for spares; 950 5 feet eight long for auxiliary condenser and 25 for spares; 215, 2 feet 8 inches long for augmentor condenser and 25 for spares. These tubes were supplied by Scovill Mfg. Co.

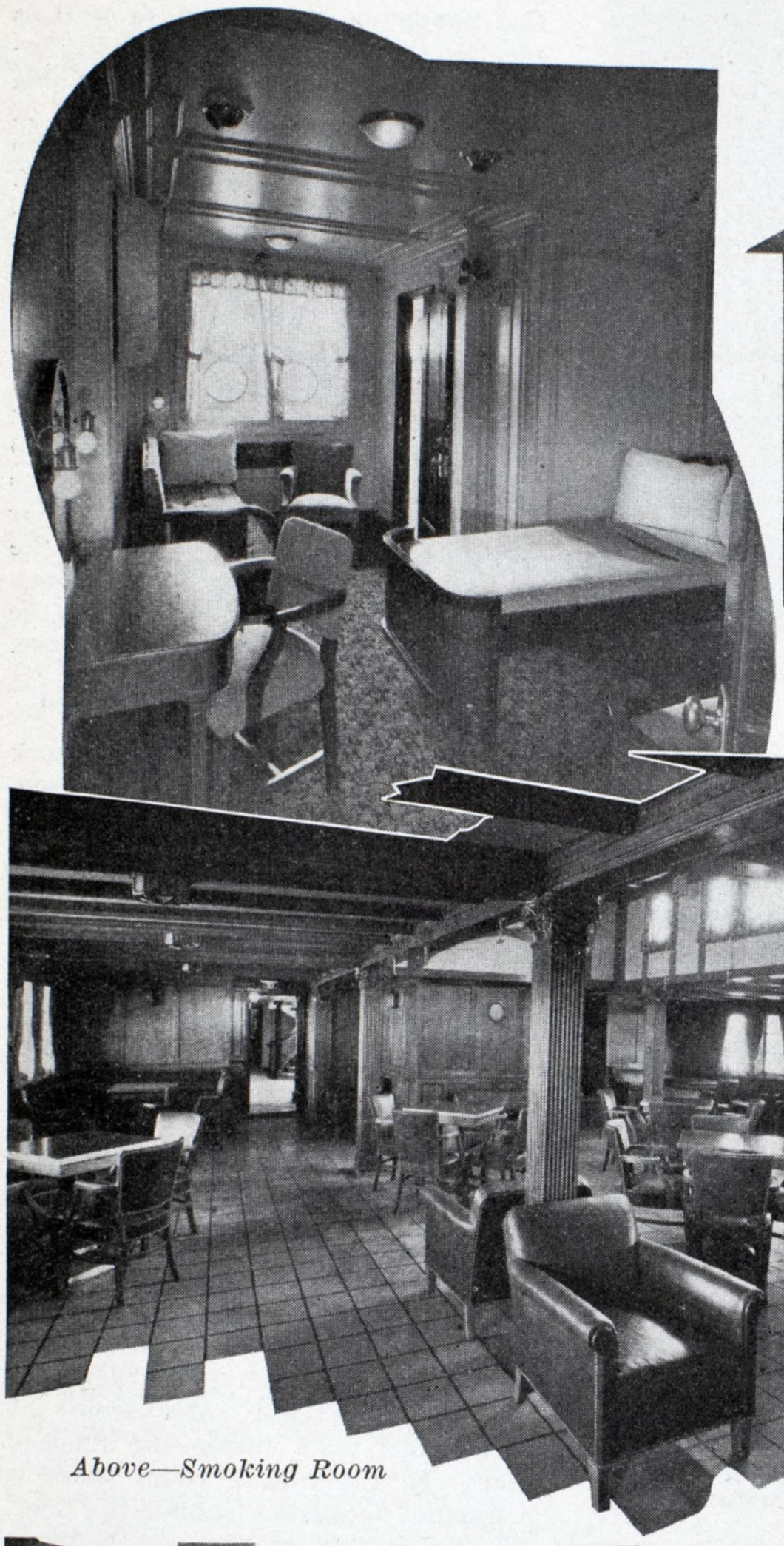
Wire Rigging—Supplied by Wickwire Spencer Steel Co.

Deck Covering—Over 50,000 square feet of wood and steel deck covered by Asbestolith. Staterooms are laid in a French ochre color; passage ways with a black base and border and French ochre floor with filled in joints of black laid in diagonal squares. The smoking room has a blue-black base and border, the floor, being a dark French grey with one-half inch blue-black joints, giving a tile effect. Buff floors, black base and border and black joints are generally used in lobbies. The main foyer has a three-inch base, black borders and buff floor with green joints and 14-inch squares.

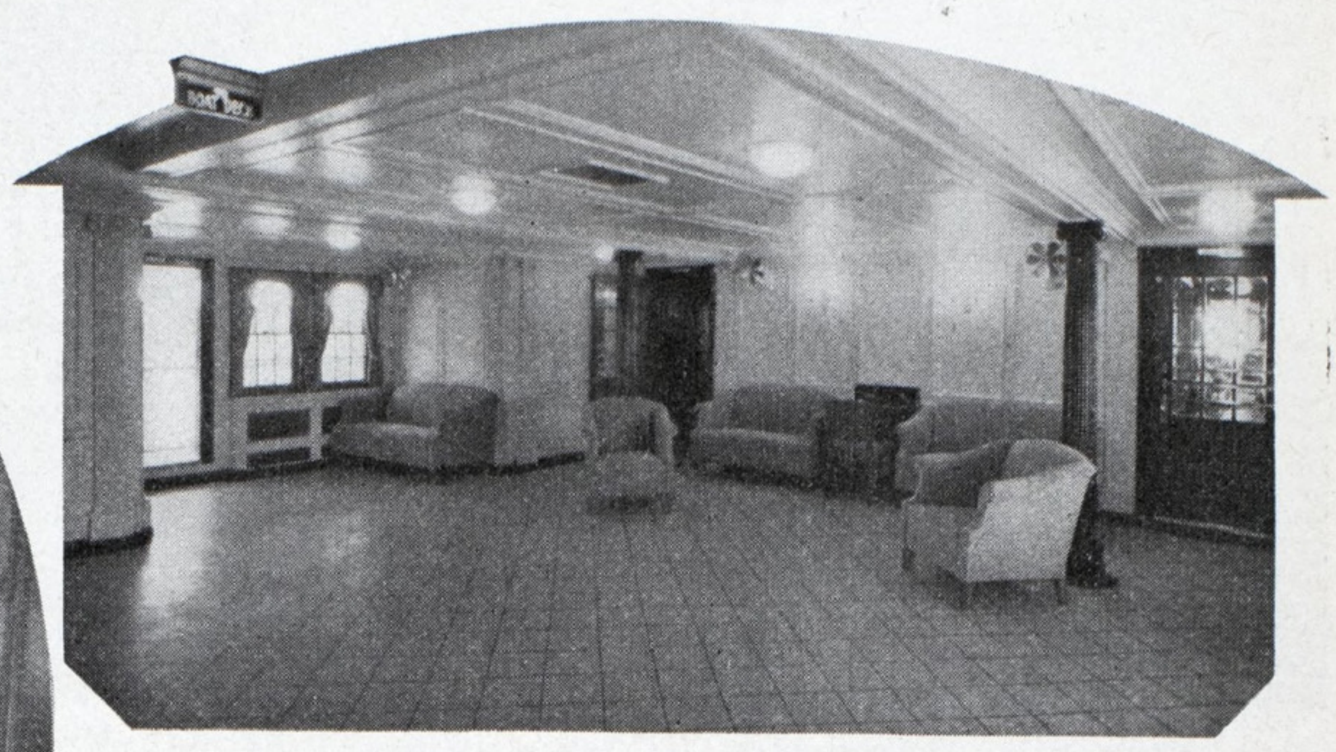
Stateroom Bulkheads—Metal faced plywood panel known as Plymetal, made by Haskelite Mfg. Co. is used for stateroom bulkheads and engineers quarters.

Ceilings and Panels—Something over 30,000 square feet of manufactured board known as Vehisote was supplied by The Pantasote Co., Inc.

Passenger Spaces on the S.S. Florida

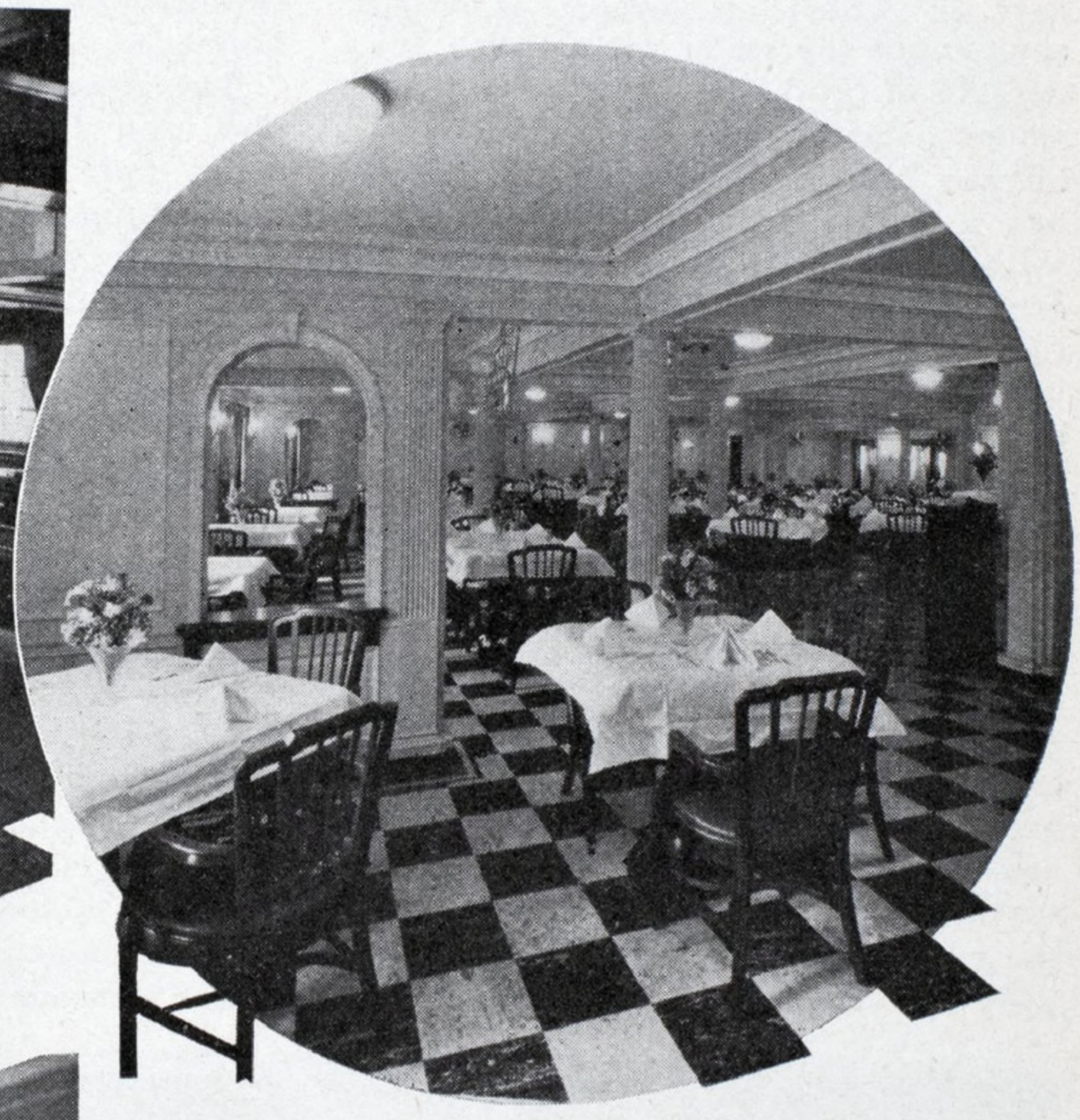


Left—Passenger Suite



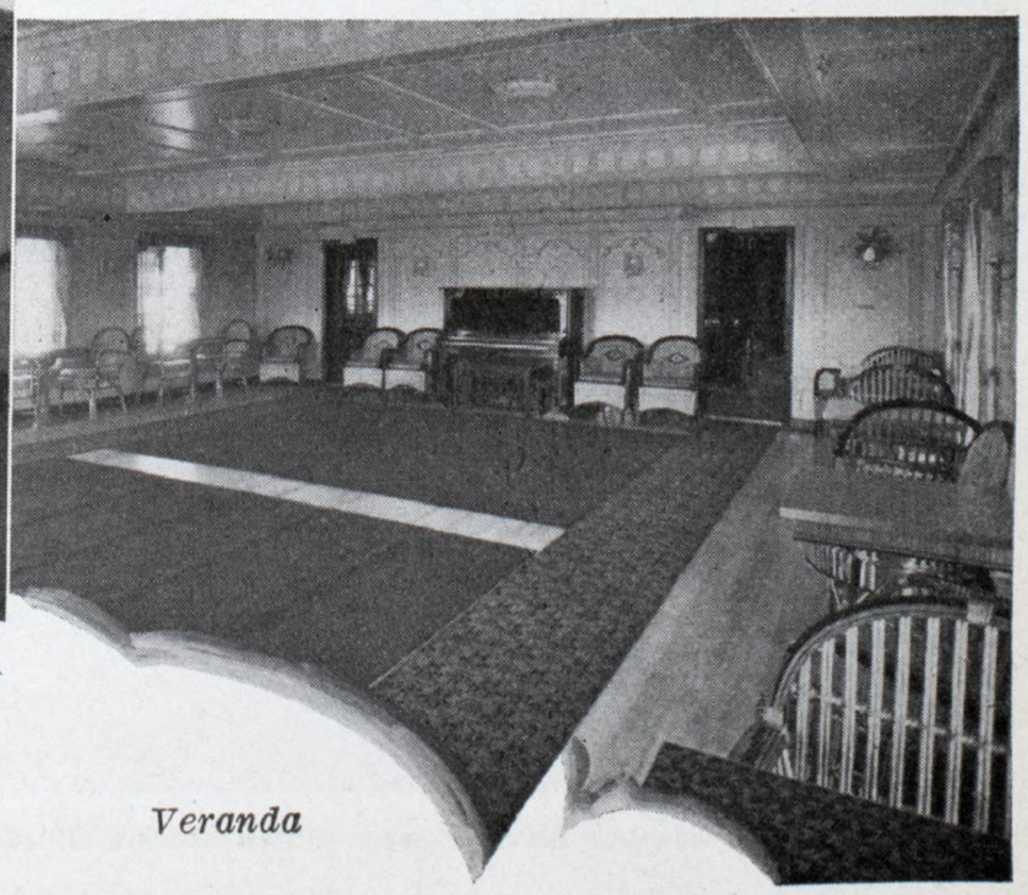
Above—Aft Saloon Deck Lobby

Above—Smoking Room

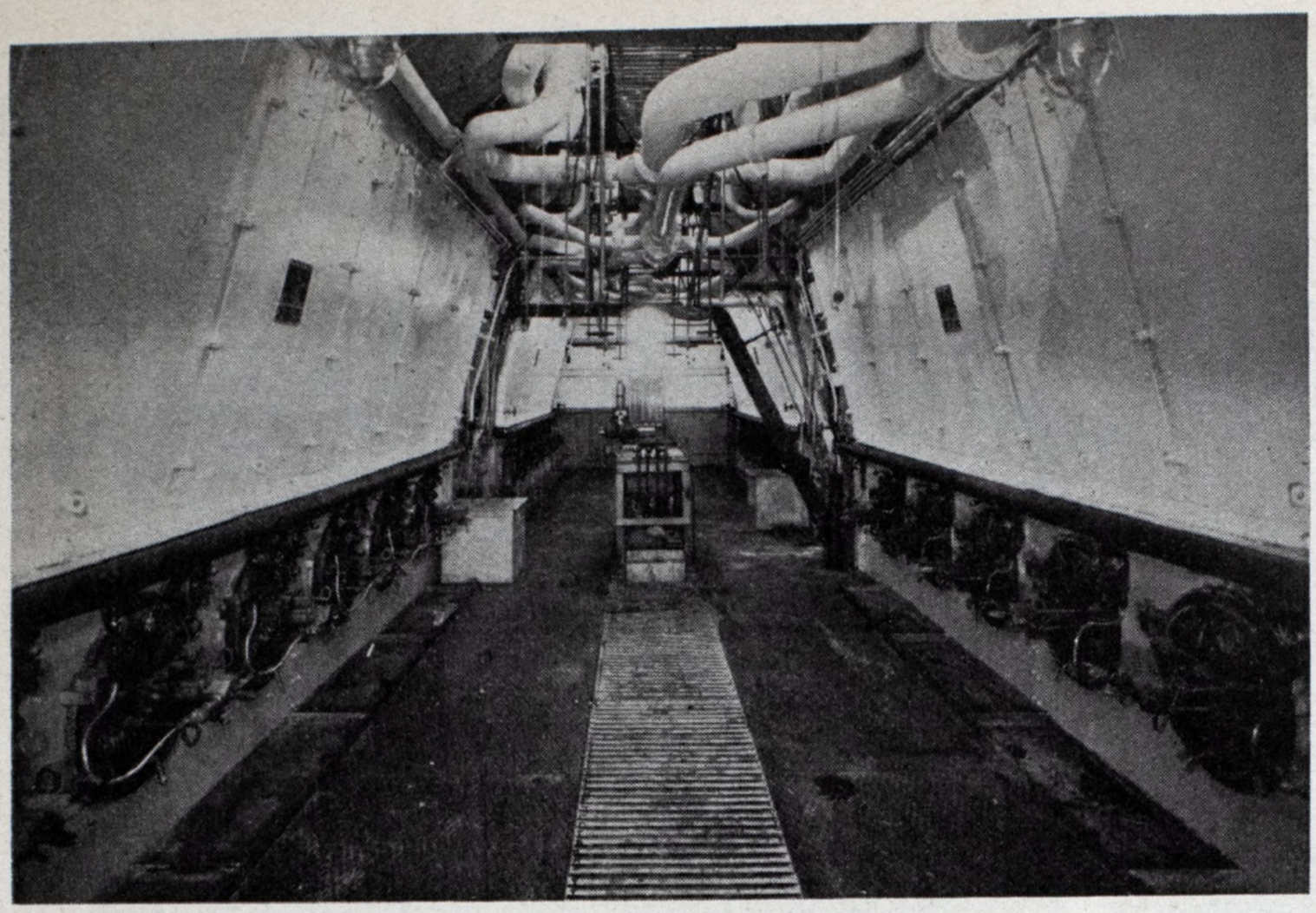


Above—Dining Room

Forward Stair Hall—Promenade Deck



Veranda



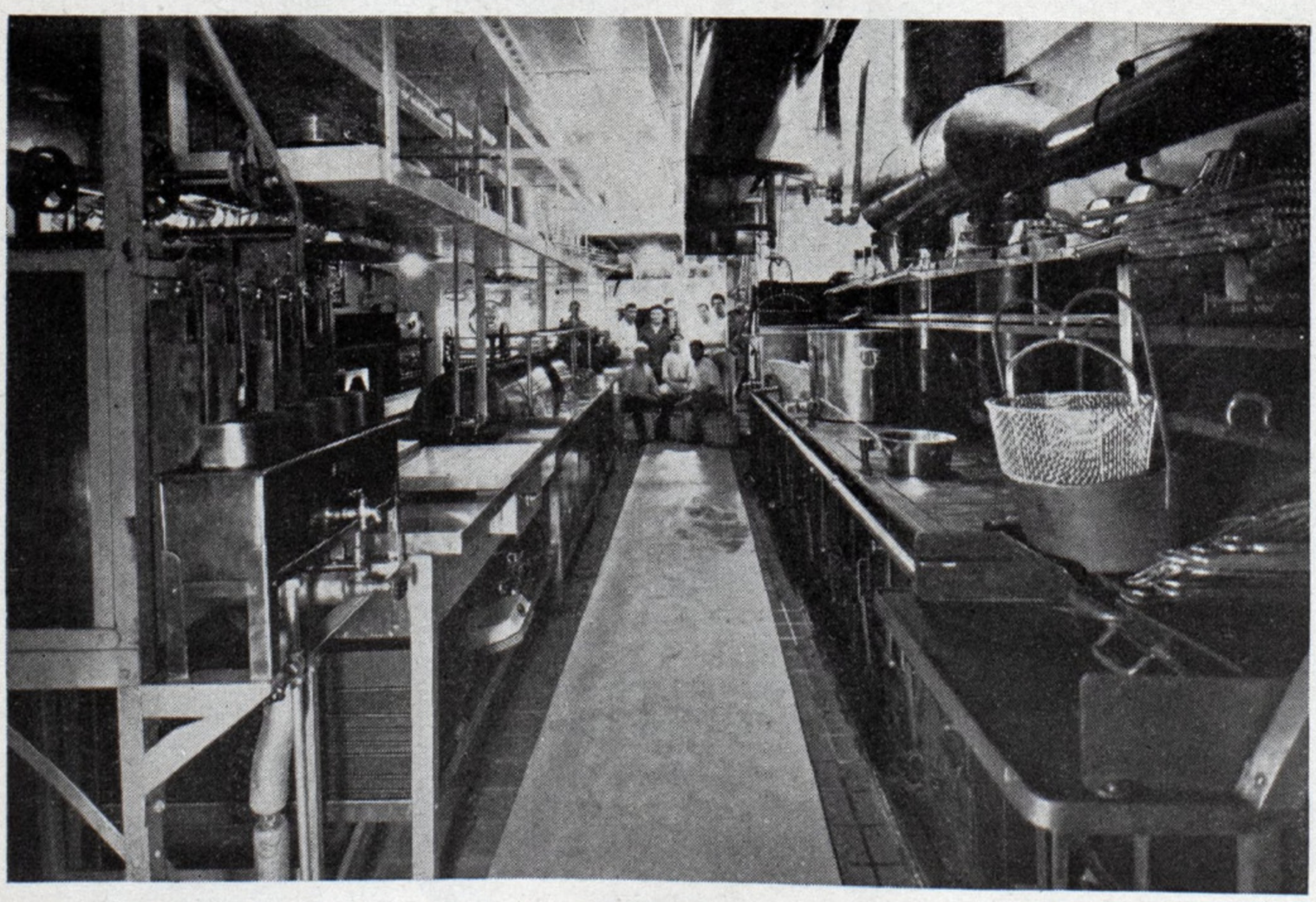
Boiler Room S. S. Florida—Four Babcock & Wilcox Watertube Boilers Arranged Fore and Aft—Fitted With Todd Oil Burners

cove in which an airport is fitted connecting the inner rooms with the outside of the ship. All beds in passenger staterooms are metal, mahogany finished, and each stateroom has a lavatory with running fresh water and a full equipment of modern, chromium-plated toilet fixtures. Carpets are fitted in all suites, and window drapes in all rooms add a pleasing touch to the appearance.

In addition to lobbies on each passenger deck at each of the two main stairways, there are provided for first class passengers a large smoking room with a beverage room attached, and a tea and dancing saloon. These rooms adjoin each other and are located at the after end of the saloon deck. The interior of the smoking room is paneled in oak, it has a dome skylight with transom windows over the central portion, and is furnished with the customary small tables and comfortable chairs which are upholstered with Spanish leather.

The veranda is attractively paneled and finished in a pale green color, and has a waxed maple floor for dancing. Reed chairs and tables, and rugs add the necessary fixtures for an ideal tea room setting. Large double casement windows in this room make it possible to convert it into an open pavilion in warm weather and an enclosed one when the weather is cool. A Radio corporation cabinet is provided for receiving broadcast programs and distribution is made to loud speakers located in all the principal public spaces and also to the second class hall.

A dining saloon for first class passengers, with a seating capacity for 176 at tables for two, four and six persons, is located at the after end of the upper deck. This room, which extends the full width of the ship, has enamel finish with mahogany trim and is a cheerful inviting place in which to dine. The furniture is mahogany and includes two handsome sideboards, as well as the regular dining and serving tables and comfortable four-legged arm chairs with upholstered seats. A glass enclosed cigar counter is also fitted for the convenience of diners. The dining saloon is directly connected by enclosed stairs to a modern, fully equipped galley and pantry located on the deck below.



Main Galley on the New Twin Screw Turbine Liner Florida

Accommodations are also provided for 130 second class passengers in two compartments on the lower deck aft. One of these has berths for 50 women and the other accommodates 80 men. Dining arrangements for these passengers are provided on the main deck of the galley, and an open deck space at the after end of the upper deck is set apart for their use.

Complete System of Ventilation

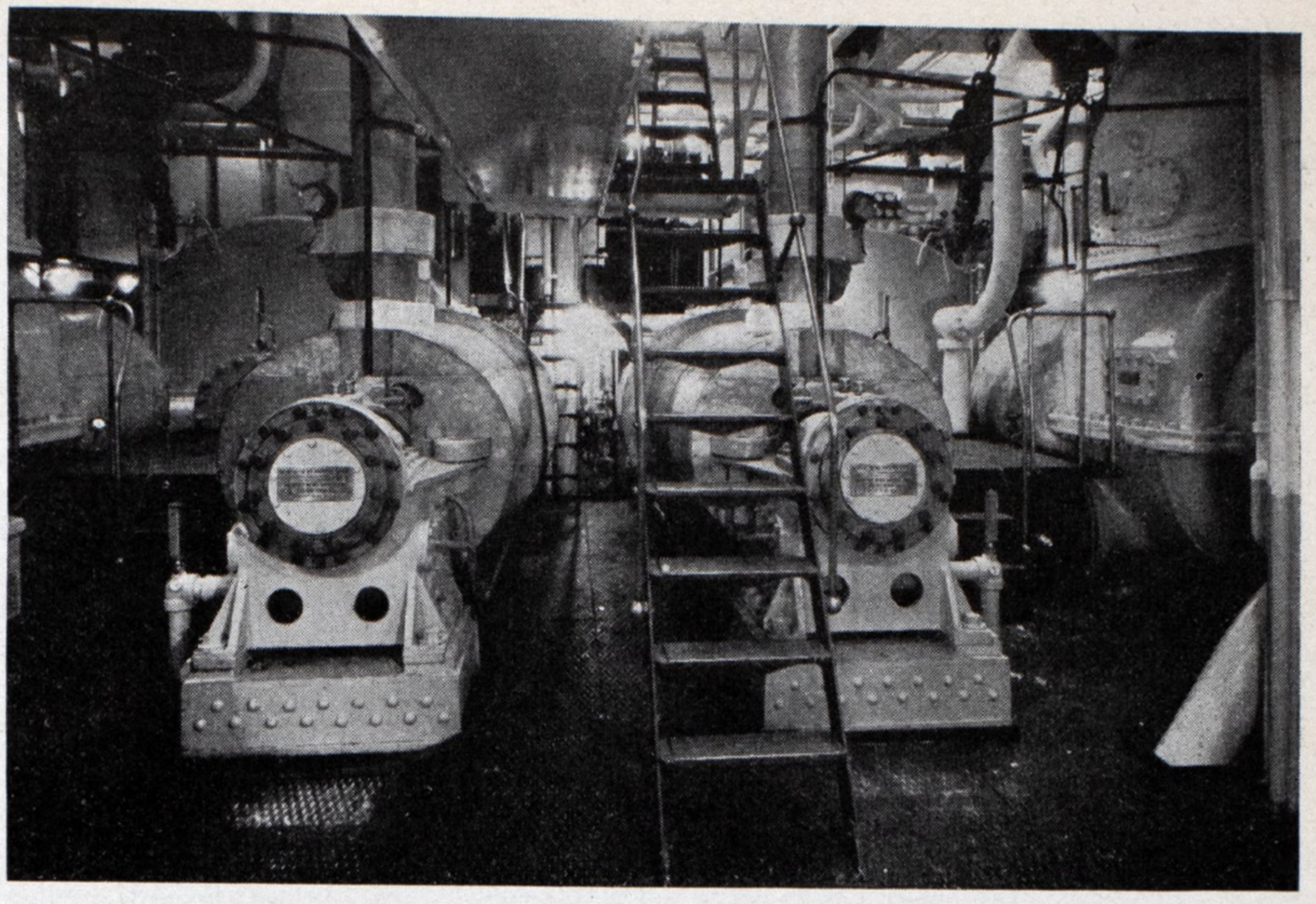
In general the joiner work throughout the passenger accommodations is plywood, finished ivory, with mahogany doors and trim. The main stairways all have metal balustrades and mahogany rail and newels. All windows and exterior doors are teak. In the boat deck houses the finish in the wheel house and the captain's quarters and officers' quarters is oak. All toilets and baths, both public and private, are entirely enclosed by steel bulkheads and finished in white enamel.

For deck covering asbestolith has been used generally throughout the vessel in all public spaces and staterooms. In the smoking rooms, lobbies and passages the covering is in tile form with filled joints and border of a different color from the main body, and forms the finished floor. In the dining room there is a finished Goodyear rubber tile floor. All main stair treads and landings are also rubber covered. Vitreous tiling is used in all public and private baths.

Since the vessel will be operated in a warm climate particular care has been taken to provide efficient ventilation for all living and working spaces. For this purpose there are fitted 12 separate systems of supply air and 4 systems of exhaust, each system connected to an electrically operated fan. All passenger staterooms on the main and upper decks, and the inside rooms on the promenade and saloon decks, have supply ventilation. Similar supply ventilation is provided for the main dining room, main lobby, second class quarters and messroom, crew's living quarters and messrooms, galley and engine room. Mechanical exhaust ventilation is provided for all toilets and baths on main deck, and for all inside public and private toil-

ets and baths on upper, promenade and saloon decks; also for the galley and the refrigerating machinery room.

In addition to these mechanical systems each passenger stateroom has an electric oscillating fan, and similar fans are fitted throughout the dining saloon, lobbies and other public spaces, in the second class quarters, and in all officers' and crew's staterooms and messrooms. An interesting and unusual feature of the mechanical ventilation system is the provision for preventing heat radiation from the boilers, uptakes and stack through the boiler casing. The latter, in addition to having the customary heat insulating material on the outside, has an air casing fitted all around on the inside and this casing is connected to one of the supply fans thus providing continuous air circulation. The majority of the ventilation fans are located on the boat deck.



Main Engine Room on the S. S. Florida—Two Parsons Type Newport News Turbines With DeLaval Reduction Gears. Maximum S. H. P. 9500

Provisions for Carrying Automobiles

While the major service is the transportation of passengers the vessel is also fully equipped to carry a limited amount of freight and special provision has been made for the carriage of automobiles. The latter will be carried on the main deck in compartment No. 2 and in No. 2 'tween decks and hold. An electrically operated elevator 18 feet x 9 feet 6 inches is fitted in No. 2 hold for the handling of automobiles to the 'tween deck space and hold. Similar elevators of a smaller size are fitted in No. 1 hold and for the lower deck freight space aft of the engine room, for general cargo use. All freight is handled through side ports of which there are three on each side, off the main deck. Besides these freight ports there are two passenger entrance ports on each side off the upper deck. The elevators were furnished by the Bayard company, Philadelphia, and are operated with Diehl electric motors and Cutler-Hammer controls.

The extensive use of electricity for such things as motive power for freight elevators and ventilation fans, for lighting purposes, and with some of the galley equipment, necessitates a fairly large light and power plant. There have accordingly been fitted on a flat in the after end of the engine room three 75 kilowatts Westinghouse turbo-generating sets and a 10-kilowatt Diehl motor-generating set. For emergency lighting purposes there is fitted in the boat deck house a 5-kilowatt gasoline driven generating set.

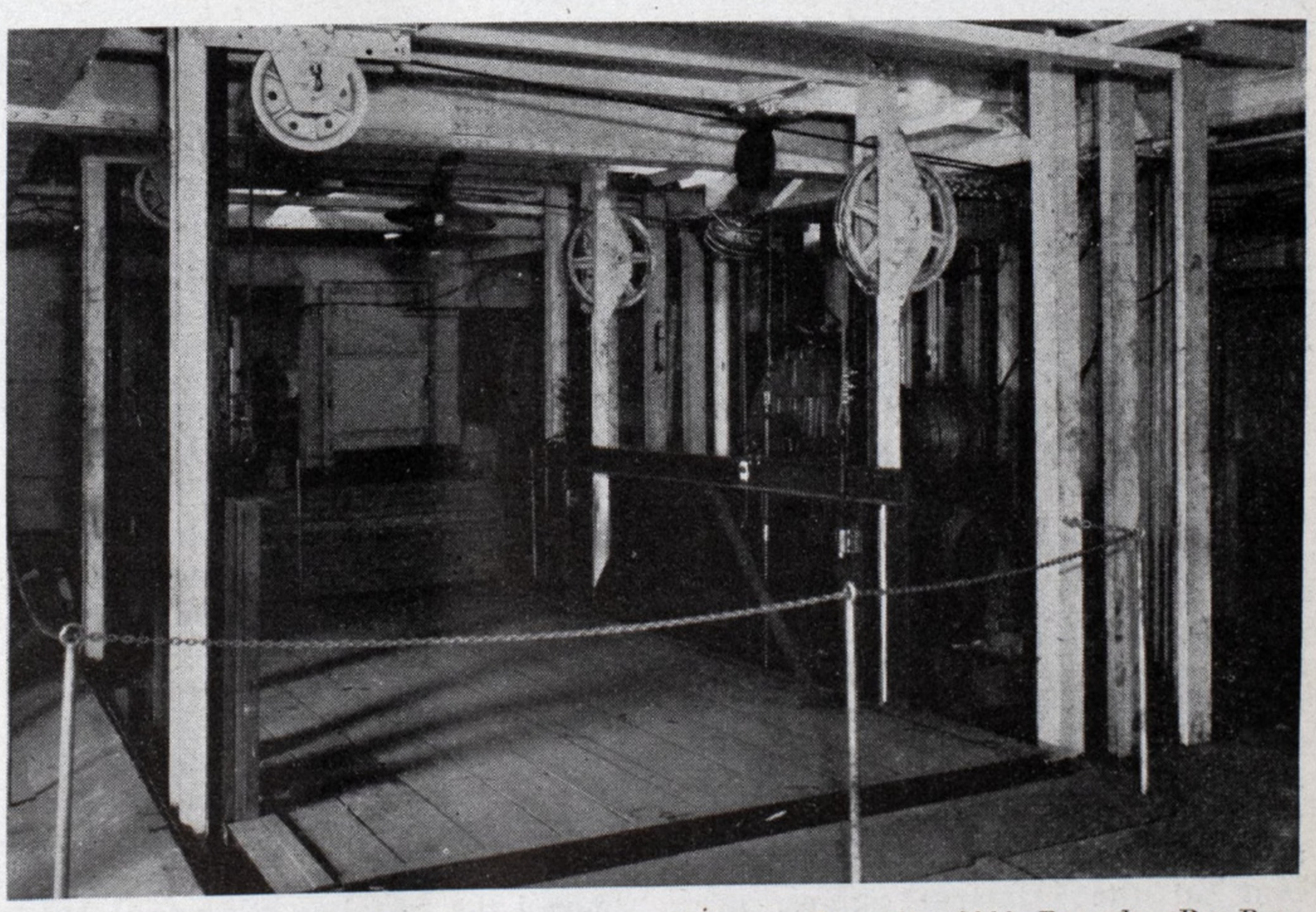
Large cold storage rooms for the carriage of ship's provisions are fitted adjacent to the galley. For the cooling of these rooms there are provided two 5-ton De La Vergne, steam driven ice machines, which are located in a separate compartment, between the shaft alleys, aft of the engine room.

Other hull auxiliaries include a right and left hand screw type steam steering gear, a steam windlass, and two steam capstans aft, all of the American Engineering Co.'s make. There is also a 10-horsepower Diehl electric boat winch for raising the life boats.

Life saving equipment includes seventeen 26-foot metallic life boats of fifty person capacity each and one motor life boat, providing boat capacity for the entire number of passengers and crew. These boats are carried under twelve sets of Steward mechanical davits, six sets of boats being nested.

Other equipment includes an 18-inch searchlight forward and one of the same size aft, radio direction finder, Willett-Bruce electric whistle operator, rudder indicator, shaft revolution counters in pilot house, mechanical telegraphs, telephone system for ship service, watchmen's clock system, and a powerful wireless telegraph system. For fire alarm and detection there is a Garrison automatic system for all passenger's and crew's sleeping quarters, and a Lux-Rich fire detecting and extinguishing system for cargo spaces, paint and oil rooms, and similar spaces. A Lux fire extinguishing system is fitted in the boiler room and holds. The watertight doors in the machinery space and shaft alley are electrically operated from the pilot house and at the door by Cutler-Hammer control system.

The propelling machinery consists



Automobile and Cargo Elevator on S. S. Florida—Capacity 6000 Pounds—By Permission M. L. Bayard & Co.

of two sets of cross compound, single reduction geared turbines, four oil-burning watertube boilers, and all necessary auxiliaries. Each set of turbines consists of one high pressure and one low pressure ahead turbine arranged in series, each driving its own pinion through a flexible coupling, an each set has its own condensing plant, thus making two complete units. The ahead turbines are of the straight Parsons reaction type designed for saturated steam of 215 pounds gage pressure and for a total normal output of 8500 shaft horsepower at about 1800 revolutions per minute, with a continuous maximum of 9500 shaft horsepower.

For astern use there are fitted in the exhaust end of the low pressure casings two three-bucket impulse wheels to give a total astern power of about 55 per cent of the ahead power at about two-thirds of the ahead revolutions. The turbines were built in the shops of the Newport News Shipbuilding & Dry Dock Co. The single reduction gears are of the double helical single plane type designed and built by the De-Laval Steam Turbine Co. and have a reduction ratio of about 11 to 1. Thrust bearings of the Kingsbury type are incorporated in the forward end of the gear casings. Each set of line shafting drives a solid manganese bronze four-bladed propeller 12 feet 6 inches diameter and 14 feet 6 inches pitch, which turns outboard when going ahead.

High Vacuum Condensing Equipment

The condensing plants were designed with particular reference to maintaining a high vacuum in the tropical waters in which the vessel will operate. There are two main condensers located outboard of the low pressure turbines, each having about 6650 square feet of cooling surface, arranged in two passes. Each condenser is served by a Warren vertical twin beam air pump 12 x 30 x 21 inches and one Wheeler radojet augmentor. Circulating water is supplied by a steam-driven centrifugal pump built by the shipbuilders to their own design and each of the two pumps is capable of delivering 11,000 gallons per minute at 25 feet head. For port use there is an auxiliary plant consisting of a condenser with 1005 square feet of cooling surface, a 1000-gallon per minute centrifugal pump driven by a vertical Sturtevant engine, and a Warren vertical simplex air pump.

Other engine room auxiliaries include a Griscom-Russell Reilly two-pass feed water heater for single stage feed heating, and a Reilly evaporator of 30 tons capacity. The main and auxiliary feed pumps, and in general all the principal pumps, are steam driven, vertical simplex reciprocating type of Warren make. A few of the small pumps for fresh water service in port are motor driven.

There are four main boilers of the Babcock & Wilcox standard marine watertube type arranged in one fire room with the drums fore and aft for athwartship firing. The boilers are designed for 250 pounds working pressure and saturated steam, and have a total heating surface of about 28800 square feet. Each boiler is fitted with six Todd burners designed for burning oil under forced draft, the oil being heated in three Todd fuel oil heaters. Diamond soot blowers are fitted to each boiler. The uptakes from the four boilers combine into one stack.

Forced Draft is Supplied

Forced draft is supplied by two Sturtevant fans each having a capacity of about 35,000 cubic feet of air per minute. The fans are located on an elevated platform in the after end of the boiler room so as to draw air from the top of the fireroom and provide additional ventilation to the latter. The air is led through separate ducts under the fireroom floor to each boiler front. The fans are engine driven, the engines being located on a flat in the engine room and the shafts extending through the bulkhead between the engine and boiler rooms.

The keel of the FLORIDA was laid on Sept. 2, 1930, and the vessel was launched on March 7, 1931, the sponsor being Miss Leila Delano, daughter of the executive vice president of the Atlantic Coast Line railway. On May 12 an extensive sea trial was given off the Virginia coast during which full speed runs were made in each direction between Chesapeake and Winter Quarter light vessels. On these runs an average speed of about 21¼ knots was obtained. The results of the trails were very satisfactory to both the owner and the builder, the propelling and deck machinery functioning without a hitch of any kind and successfully meeting all tests.

Immediately after delivery the FLORIDA sailed for Key West where she will enter into the Peninsular & Occidental Steamship Co.'s service and run in conjunction with the S. S. CUBA and S. S. GOVERNOR COBB. J. J. Saunders, vice president and general manager of the line, who took an active interest in the building of the vessel, making frequent visits to the shipyard while she was under construction, together with Carroll S. Smith, consulting engineer, and other representatives of the owner and the builder, accompanied the vessel on the trip to Florida.

The steady growth in the volume of passenger travel and the movement of freight between Cuba, and West Indies, other Latin-American countries and the United States via the ports of Key West and Tampa has created a demand for increased transportation facilities. The building of the FLORIDA, therefore, at a cost exceeding $2,600,000, is in accordance with the long established policy of the Peninsular & Occidental Steamship Co. of keeping abreast of the times by providing an adequate and especially satisfactory service for the many patrons of the line.

The Peninsular & Occidental Steamship Co. was organized in 1900 and incorporated under the laws of the state of Connecticut. Its formation resulted from the merging of the Florida East Coast Steamship Co. then operatitng between Miami, Key West and Havana, and the Plant line operating between Port Tampa, Key West and Havana. For many years it also operated freight and passenger service between Miami and Nassau, but has now discontinued that service.

When the Flagler system extended its line below Miami, the steamer line shortened its service to connect with the rail line at Knights Key instead of Miami. When the overseas extension was built by the Flagler system into Key West in 1912, the steamer line again shortened its run to connect with the rail line at Key West instead of Knights Key. Its present service, therefore, is between Port Tampa, Key West and Havana. It is the pioneer line between Florida ports and Cuba and by reason of its dependable year-around service has firmly established itself in popular favor for both freight and passengers between the United States and Cuba.

Operate on Regular Schedule

Passenger and freight ships are operated on regular published schedules, scrupulously maintained. During the winter tourist season sailings between Key West and Havana are daily and between Port Tampa, Key West and Havana, four times per week. During the summer months there are five sailings per week between Key West and Havana and two per week between Port Tampa, Key West and Havana.

Terminal facilities at Key West are maintained jointly with the Florida East Coast railway and at Port Tampa with the Atlantic Coast Line railroad. Direct shipside connection is made with through passenger trains to and from all points in the United States and Canada. Transfer of freight, express and the United States and foreign mails is also expedited by this direct shipside connection.

Of the other steamships of the company referred to above, the S. S. CUBA is a twin screw vessel, 342 feet long with a beam of 47 feet, speed, 17

knots, licensed to carry 512 passengers and built especially for service in the semi tropics. The GOVERNOR COBB is a triple screw turbine driven vessel, 289 feet in length, with a beam of 54 feet, speed 17 knots and licensed to carry 448 passengers. The S. S. MIAMI is a twin screw vessel, 250 feet in length, 40 feet beam, 14 knots speed and is licensed to carry 208 passengers. For service during the winter tourist season only, the S. S. NORTHLAND has been chartered to supplement the other ships. This vessel is 328 feet long, 48 feet in beam, speed, 17 knots and is licensed to carry 675 passengers. On each of these ships there is ample space for cargo, passenger automobiles and mails. All ships burn oil for fuel and are well found with all modern devices.

Plan New Atlantic Line For Philadelphia

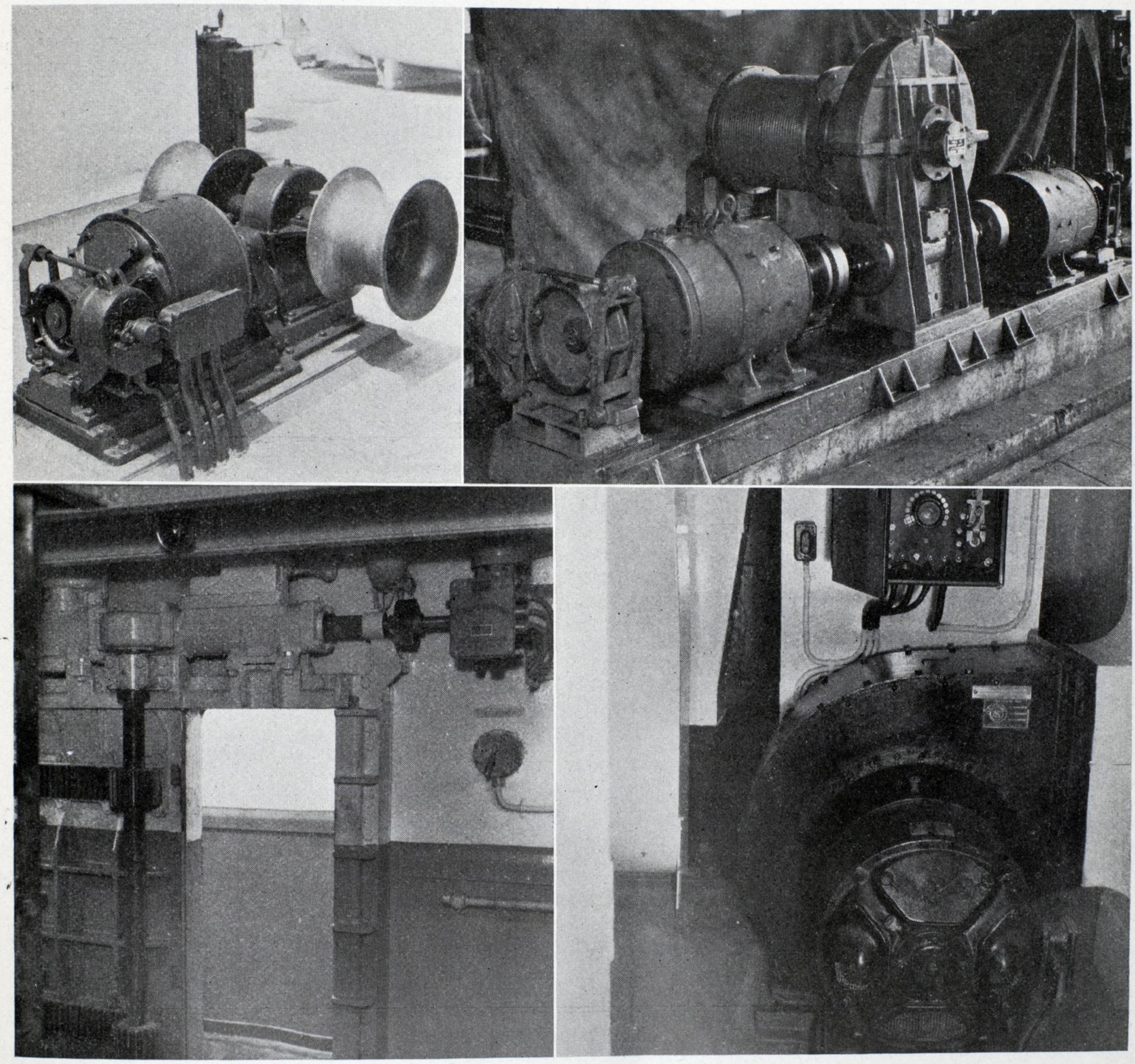
At a luncheon of the Manufacturers' club in Philadelphia on May 12, General W. W. Atterbury, president of the Pennsylvania railroad, announced plans for the establishment within a year of transatlantic passenger-freight steamship service from Philadelphia to Liverpool and Manchester, England, with three seven-day liners.

The Pennsylvania already has pledged $500,000, and assurances have been given by the Reading and Baltimore & Ohio railroad companies that each of these will subscribe to $250,000 worth of stock for the steamship company, General Atterbury said. Philadelphia will be asked to subscribe to $4,000,000 worth of stock, so as to make the company of a co-operative character, with importers and exporters as well as industrialists of Philadelphia vitally interested in its conduct.

Under the proposed plan three ships are available for the start, two from the International Mercantile Marine and one from the United States shipping board. The ships could be purchased and remodeled for $1,600,000 each.

The ships would be used in combination passenger and freight service, and a mail contract would have to be obtained to aid the development of the line, General Atterbury said.

It would be necessary, in General Atterbury's opinion, to have the $5,000,000 capital available at the start, so as to eliminate expense.



S. S. Florida. Upper Left—Motor Driven Boat Winch. Upper Right—Motors Drum and Controls for 6000-Pound Elevator. Lower Left—Watertight Door and Control. Lower Right—Motor Driven Ventilating Fan and Controls

Passenger Trade on North Atlantic

World's Greatest Ferry—Ever More Speed and Luxury Demanded, Advancing Shipbuilding — Pre-eminence Here is an Accolade of Highest Merit

Part I

By W. L. Harms

PASSENGERS, or at least competition for their patronage, has caused the transatlantic liner to develop to so superlative a type of ocean vessel.

Were it not for that great volume of passanger traffic between Europe and North America, for at least sixty-five years not approached on any other ocean route of the world, the transatlantic trade would be served just by ships of comparatively modest design, similar to those plying to the Orient, Australia, Africa, and South America. These would in general be constructed with primary consideration for cargo transport, with provision on the side for a certain amount of passenger accommodation; moderate speed would be the rule. A few fast passenger carriers might be looked for, ships of the ORAMA class, headed perhaps by a CAP ARCONA or EMPRESS OF JAPAN.

On routes other than the transatlantic the passenger service has usually been a secondary item, the traffic being founded essentially upon cargo movement. Indeed, about the only instances where passenger transport has taken precedence on such routes have been the gold rushes to California and Australia in the early 1850's. And it was in connection therewith, by the way, that the celebrated American clipper ships attained their highest development, sharing with the later British tea clippers the renown of having been the fastest sailing ships ever built.

Ocean Greyhounds for Passengers

Extravagant development of liner design is not possible on cargo routes. To support greyhounds there would necessitate freight rates that the traffic could not afford. To be exported merchandise must be marketable, and to be marketable it can stand just so much assessment and no more.

But on the Atlantic, in the face of very considerable cargo business, the passenger ferry has nevertheless led in importance in virtue of the perennially heavy stream of travel between the Old and New Worlds. And as passenger fares are not altogether so rigidly controlled by commercial economics, as freights are by prices, the transatlantic shipping companies have found it possible in the course of their competition to pit against each other vessels of steadily increasing speed and magnificence. This race was indeed suspended for a dozen years or so, due to the sobering effects of the World war, but it has latterly been taken up again with all the earlier enthusiasm.

The great transatlantic passenger trade and the transatlantic liner both date from just after the close of the War of 1812.

In Colonial times the work now done by the ocean liner was performed largely by private merchantmen, whose owners, employing them primarily for transporting their own merchandise, made a little profit on the side in accommodating passengers, carrying mails, and utilizing unfilled cargo space by taking on the shipments of others.

The Earliest Mail Packets

In addition to those merchantmen there appeared on the ocean as early as the seventeenth century a class of vessel, the English government mail packet, engaged in a service very suggestive of that of the modern liner. The significant feature of their employment was that these packets served regularly on a definite route and, what is most interesting, they sailed on their schedule dates of departure whether the winds favored them or not. These are the first obligations of a present-day liner.

Private interests also occasionally sought to operate packet service, as common carriers of passengers, cargo, and mails. However, their efforts were not attended with much success in those days; navigation was a risky business financially, because of the constant menace of foreign aggression on the seas, even in times of peace among governments. Furthermore, commerce was discouraged by the arbitrary restrictions placed by the nations on each other's vessels.

With the close of the War of 1812 a new spirit of respect for each other's rights arose among the maritime powers in general. Commerce was now freed of oppressive legislation, and peace and security were assured on the seas. As a result ocean trade and travel began to increase to such an extent that the common carrier became an absolute necessity in transatlantic traffic. The remedy was obvious, and the Atlantic liner sprang into existence, the privately operated packet services quickly multiplying and taking on the aspect of "big business."

The early Atlantic liners of course were just sailing ships, but of a class that quickly won admiration for speed and seagoing qualities. And they were all of American nationality.

It was in these years that emigration from Europe to America got under weigh. Beginning with a few thousands the annual rate rose to the twenty thousands in the course of the 1820's, jumping to the sixty and

---

The second and concluding part of this article will appear in the July issue.

A Modern Record

THE North German Lloyd liner Bremen during the first year of her operation, completed July 1930, carried 54,153 passengers and covered 128,000 miles. Of these passengers 16,855 were carried in third class, the most popular part of the ship, the first c ass passengers numbered 15,-123, tourist third class 12,379 and second class 9796. Of the total of 54,153 passengers carried 26,587 were from Europe and 27,566 from the United States.

On her first trip to the United States, the Bremen made the crossing in 4 days, 17 hours and 42 minutes at an average speed of 27.83 knots, establishing a world record. On her return she improved this record, making the trip in 4 days, 14 hours and 30 minmtes at an average of 27.91 knots. In October 1930 the Bremen broke her own record and made the westward crossing in 4 days, 17 hours and 18 minutes. The fastest speed by the Bremen was 29.5 knots.

seventy thousands in the 1830's, the close of the 1840's witnessing the admission to the United States of immigrants at the rate of about 300,000 per annum.

The packet lines made a very good thing of this ever increasing flow of emigrants from the old countries. Such passengers were only too glad to purchase any sort of transportation at a moderate fare, just so they would be conveyed to the land of promise. As might be expected, the companies embarked them in maximum numbers, and with very little concern in the matter of the comfort and well-being of these, their most profitable customers, except as occasional legislation compelled them to.

Up to the latter 1830's the American packets had the transatlantic field to themselves. The British had not seen their way to enter with sailing packets of their own; another flag was not to appear until late in 1848, when a line of German packets commenced running.

British Enter With Steam

Now however the British thought they saw a way of getting a foothold in the trade, not with sailing packets indeed, but with steam packets.

Steam navigation had been developing steadily as a commercial proposition ever since Robert Fulton's convincing demonstrations on the Hudson, but for a number of years it was not to rise above the river, coastal, and cross-channel stages. Several Atlantic passages had been achieved by steam vessels, but merely in such an incidental manner as the airplane and airship flights so far accomplished across the ocean in our own years.

But in 1838 regular steam packet service across the Atlantic was inaugurated by the British, and by no less than three companies. True, all three fell by the wayside again in the course of a decade. But a fourth, that began operations in 1840, was destined to prosper; the Cunard line in fact is at present engaged in the construction of the biggest ship ever projected.

During the 1840's the sailing packets, themselves advancing in design, were altogether able to maintain their supremacy against the pioneer steamers. But in the course of time the *sustained* speed and regularity of the latter told, so that at the turn of the decade the leadership definitely passed from sail to steam.

Steam Gains in Favor

The Americans themselves now went in strongly for steamships, though not at all discarding the sailing packets. In the early 1850's it came to pass that the American and British companies, on both sides backed by substantial government subsidies, contested for the favor of the transatlantic passenger in the fiercest rivalry of the sort that has ever taken place. And the ships engaged were no longer crude experiments, but finished products.

As between sailing packets, for whom their occasional fourteen-day passages were considered exceptionally fast work, and the new steamships, of which there were now quite a few that could regularly cross the Atlantic in from ten to thirteen days, it is not hard to see which way the higher-class passenger traffic drifted.

None of these subsidized lines of fast mail steamers provided accommodation thereon for emigrant passengers. Expensive as it was to operate such ships in those days of wasteful low-pressure single-expansion engines, it is strange that such a profitable phase of the business should deliberately have been omitted from consideration. But so it was.

Still enjoying the lion's share of the emigrant traffic, then, the sailing packets were able to do quite well for some years to come.

In the course of the 1850's however, there were established various lines of slower steamers, which, besides catering to cabin passengers, were not at all backward about striking out into the emigrant field. Notable among these were the Inman line (British), succeeding an earlier American sailing packet enterprise, the Hamburg-American Co. being in fact that German sailing packet line of the late 1840's already referred to but which in 1856 changed to steam, and the North German Lloyd, a newly organized concern which brought out its first transatlantic steamers in 1858.

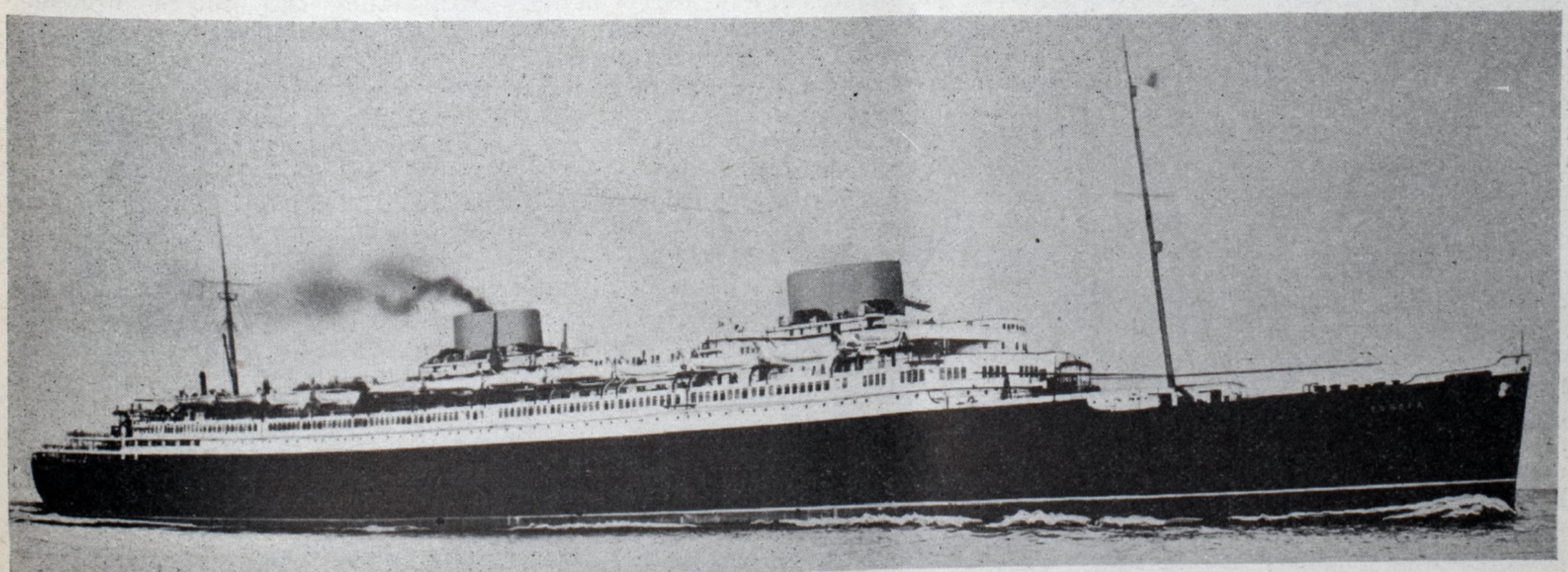
Though it was the era of that most famous of all sailing packets, the DREADNOUGHT, the twilight of that type of Atlantic liner at last set in the latter 1850's in consequence of this invasion of the emigrant business by the steamships. By the middle 1860's the sailing packet had ceased to be a factor of any importance on the Western ocean.

During the earlier 1850's immigration to the United States had risen to over 400,000 per annum. Subsequently it declined however to less than a third of that figure, due to business depression in those years. And in the earlier 1860's it was still further discouraged by the Civil war, dropping to about 72,000 in 1862, the lowest in more than a quarter of a century. After the war it immediately returned to the 300,000 level, working up to 400,000 in 1872 and 450,000 in 1873.

Volume of Traffic Increases

It was in the latter 1860's that the transatlantic trade may safely be assumed definitely to have passed all others in volume of traffic. Of passenger steamship lines alone there were as many as eight big concerns —the Cunard, Inman, Allan, National, and Guion lines, all British, the Hamburg-American Co. and North German Lloyd, both German, and the French General Transatlantic Co. Then there were some lesser companies, such as the Anchor line, just developing its transatlantic service, and a few short-lived affairs. Some of the above, as for instance the two

(*Continued on Page* 64)



Europa—Turbine Geared—Four Screws—North German Lloyd—Made Westward Crossing in 4 Days, 17 Hours, 6 Minutes

Transportation on Inland Waterways

River Terminal Facilities Described and Illustrated—Types Recommended for Various Waterways—Importance of Efficient Cargo Handling Equipment

Part III

BY E. C. POWERS

THE sore need of reducing the cost of transferring freight from barge to car and vice versa is manifest when it is considered, taking the Mississippi section as an example, that, using the present terminal facilities, obsolete in design and costly in operation, 39 cents out of every dollar earned for freight carriage is paid out for terminal charges, and that it actually costs 4 cents per ton more to load freight on the barge at St. Louis and unload it at New Orleans than it does to haul it the 1142 miles of river stretching between these two cities. Moreover, the losses and damage to freight, caused almost entirely by the present crude methods of loading and unloading, have reached the forbidding figure of 18 cents for every ton of freight hauled, amounting to four cents out of every dollar earned."

Improvement in Terminals

Quoted from Gen. Ashburn's statement in the report of the secretary of war for 1921, the above paragraph expresses forcibly the conditions in regard to terminal facilities existing at that time on the Mississippi river. Since the above statements were made, there has been considerable improvement in terminals on the inland waterways until now the freight carried by the barge lines on the more important rivers is generally handled with some facility and despatch. However, the fact that these conditions existed and still do exist on various rivers, has been directly responsible for retarding development of inland waterway transportation; directly by placing the heavy burden of excessive costs of cargo handling on the boat lines themselves and indirectly by limting the confidence of shippers in the security of freight moved by water. Fortunately, during the past ten years, there has been a more or less concerted attempt on the part of interests on the important rivers to construct modern terminals, equipped with efficient means of economically handling freight into and out of river barges. The installation of this modern handling equipment has increased the earnings of the lines and has attracted to water transportation on the rivers a great deal of freight which formerly moved only by rail.

THE importance of modern and efficient terminals to the future of transportation on the inland waterways of this country cannot be overemphasized. Inefficient cargo handling facilities, have served more than any other factor, to retard waterway transportation. The accompanying article covering terminal facilities on the inland waterways is the third and concluding part of a comprehensive article on inland waterway transportation. The first part, which appeared in the April issue, discussed improvement of important waterways; the second part, in the May issue, was devoted to boats, lines and services on the various rivers. It also pointed out just how great are the savings which can be and are being realized annually by shippers who move their freight by river.

Just as river boat operation has necessitated development of very specialized types of towboats and barges, so does cargo handling on the inland waterways require special types of terminals and cargo handling facilities. These terminal facilities cannot be of the sort at use at lake or seaports on account of a condition which is peculiar to the rivers themselves. The one big determining factor, responsible for the wide variety in types of river terminal facilities, is the fact that river levels may vary as much as 20 to 30 feet between the low and high water stage. Seaport terminals have fluctuations in depth to contend with, but in this case the effect of the fluctuation is entirely vertical. On the large inland river fluctuations in depth of water require accommodations of facilities in a horizontal direction, away from shore in case of a lowering of the water level and a movement farther inshore in case of an increase in depth. This tendency toward fluctuation in a horizontal direction has lead to the construction and operation of a variety of terminals, which can readily be accommodated to any changes in river stages.

Wharf Barge and Escalator

One terminal of this type would consist of a wharf barge, a terminal on shore, and an escalator serving as the connecting link between the two. The fixed terminal building on shore would handle the freight from and to the railroads, and the wharf barge would serve the river carriers, with the freight passing between the two by means of the escalator. With this sort of arrangement, the wharf barges have been so built that when a river barge and wharf boat are moored together, openings in the wharf boat correspond with doors in the river barge. By this means, cargo is handled between the river and wharf barge by direct access. With the escalator, four-wheeled trailer trucks are loaded with freight on the wharf barge or terminal proper and are moved between the two. By this process, the trailer trucks pass back and forth between the wharf barge and terminal without need of an attendant. After the trailer trucks have been hauled to the top of the escalator, they are segregated into trains and hauled in that manner to their destination, whether it be for loading direct into railroad cars, or for transfer to the city freight house, or to the warehouse for storage. While the process of unloading the wharf barge into the terminal is going on, trucks which have been emptied in the terminal are moved by a second escalator from the terminal to the wharf barge where they are again loaded with freight. This type of terminal is efficient for river use and is in operation quite generally where package freight is handled.

In the case of the terminal which handles freight from and to distant point for direct transfer from rail to barge or vice versa, there is a railroad incline extending from the railroad yard to the river edge, and a further extension into the water, this latter to allow for fluctuation in river stages. The incline is fitted with a cradle and a number of car floats. The cradle acts as a connecting link

with the railroad between the incline and the car float. Wharf barges are also sometimes used with this type of terminal. In this case, the function of the barge is to provide a mooring beside the car float. By this method, direct access is established between the river barge and the railroad car.

This type of river terminal facility can be successfully operated regardless of fluctuations in river stage. For use to best advantage, there must be a large amount of freight passing over it. It has been found that the trucking distance required with this type between the barge and car is at a minimum. It has also been established that this type results in low cost per ton of handling cargo.

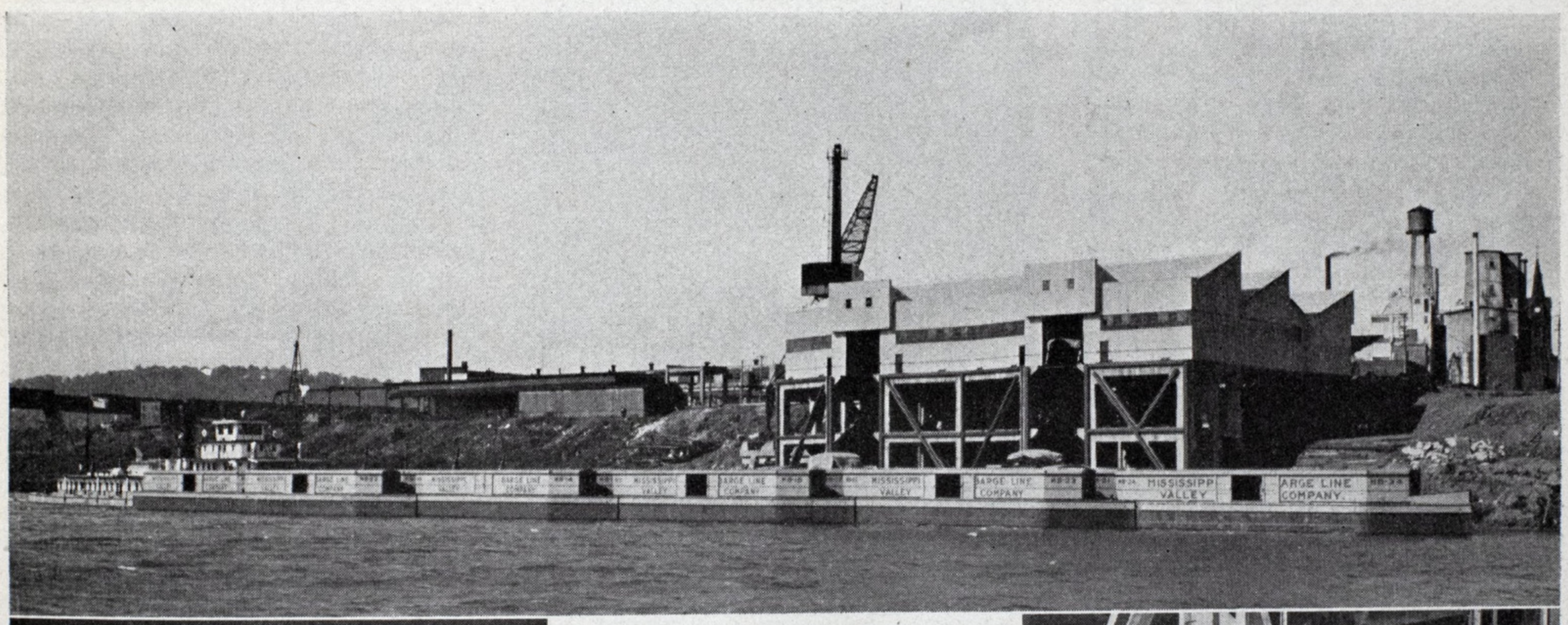
The use of cranes for handling river freight, is in vogue to some extent, but mainly for the handling of special products, steel for instance.

Among other types of terminals in operation on the rivers for handling miscellaneous freight there is the conveyor type of unloader which compensates for changes in river stage by having its outer end capable of being raised or lowered as necessary. Transit sheds are also in use, and are constructed with a number of stories and have several different levels for use with different stages of water. At such points on the rivers where there is little or no tidal or flood fluctuations, the vertical lift type of terminal is used for handling package freight.

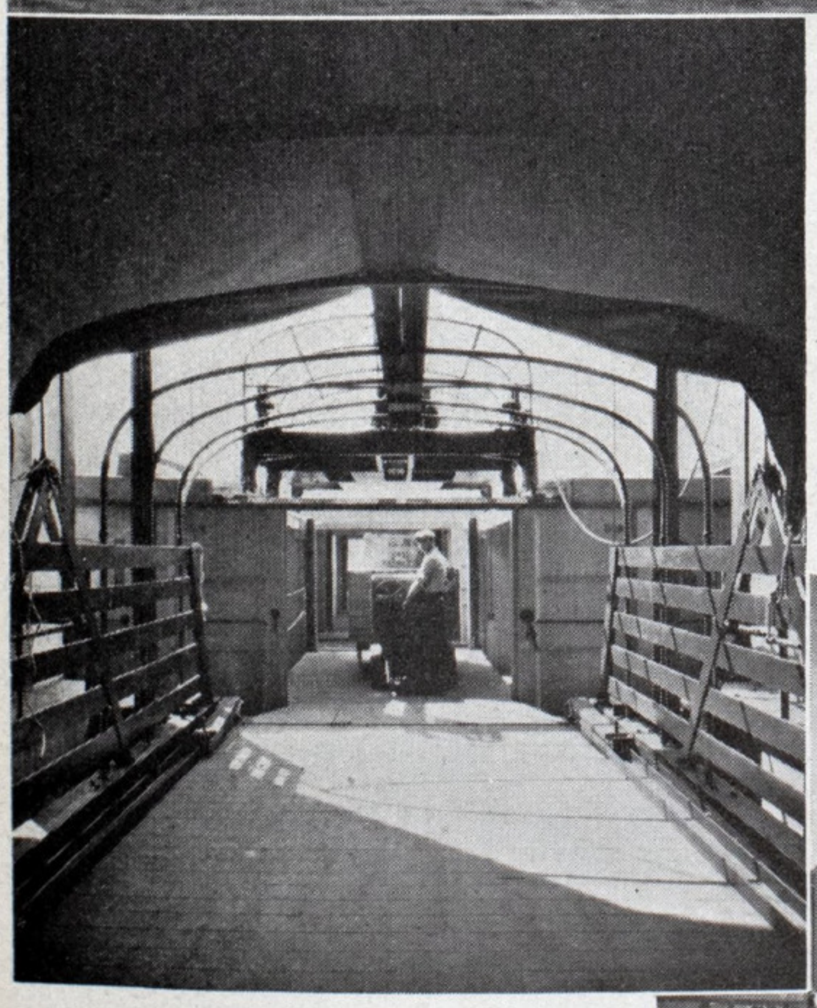
In the handling of bulk material, the type of terminal facility depends upon whether the handling is being done into or out of barges and also upon the kind of freight handled. The type of equipment in use for loading bulk cargo into barges consists of a conveyor system in connection with hoppers and chutes which lead to the barge. In unloading barges, the equipment is necessarily more elaborate and expensive. With this type of equipment, crane or bucket conveyors are used. In some of the bulk and package terminals locomotive cranes are also employed.

The table on page 34 which shows the terminal facilities of the Carnegie Steel Co. will give an idea of the type and extent of the cargo handling equipment in operation by private interests in handling coal, ore, finished and unfinished steel, etc.

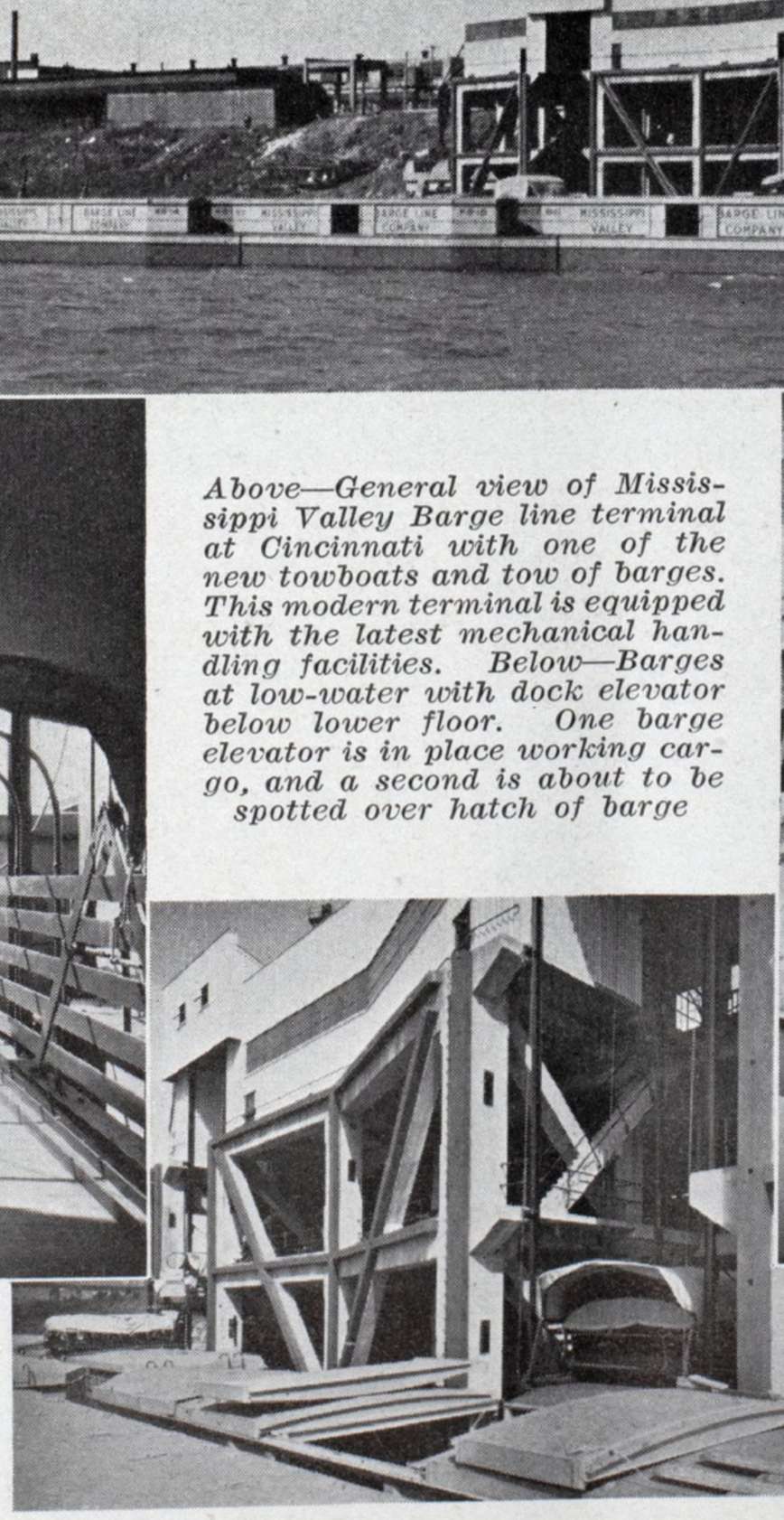
Terminal facilities on the Ohio river and its tributaries, including the Monongahela, Cumberland and Tennessee, depend as to size, type and equipment on the amount and kind of cargo which moves over them. Where there is an extensive regular movement of freight of one sort, we find a terminal designed particularly for its handling. In this case the type of equipment in use is elaborate and where there are facilities for direct transfer between river and rail and vice versa, it is still more elaborate. A number of this type of terminal facility are in

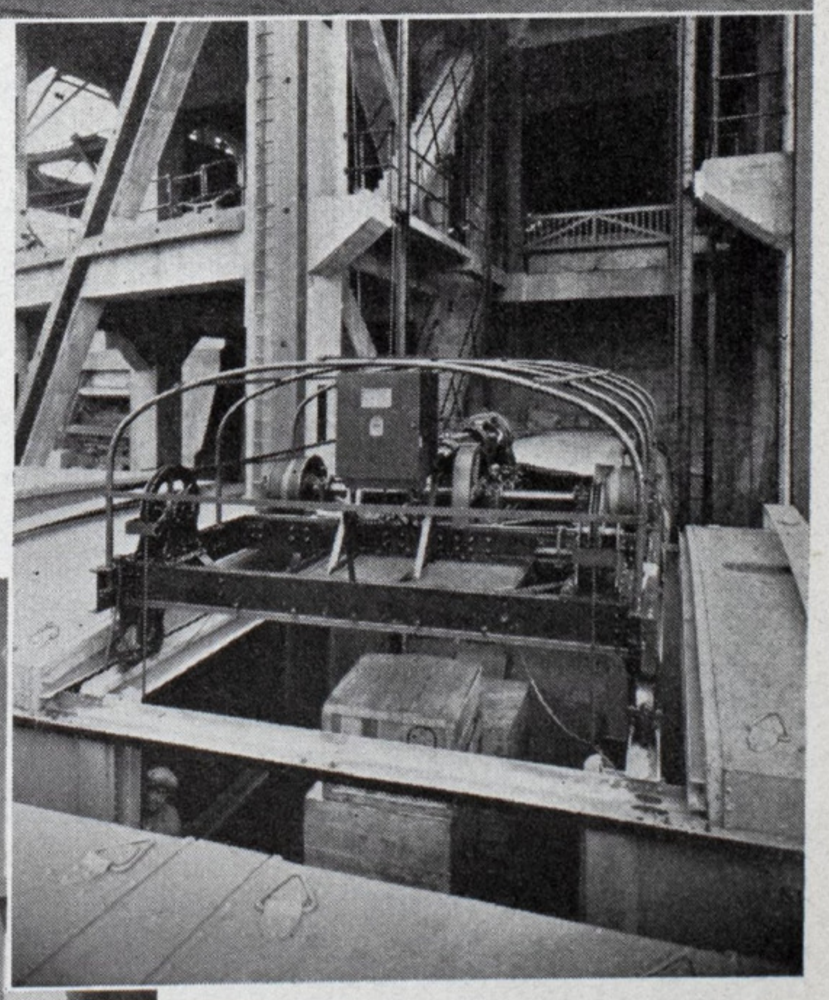


Above—General view of Mississippi Valley Barge line terminal at Cincinnati with one of the new towboats and tow of barges. This modern terminal is equipped with the latest mechanical handling facilities. Below—Barges at low-water with dock elevator below lower floor. One barge elevator is in place working cargo, and a second is about to be spotted over hatch of barge



Above — Looking into barge from platform of elevator showing truck working cargo





Above—Barlow marine elevator of the automatic swing-out platform type

operation on the Ohio river. On the Monongahela river where over 95 per cent of the commerce is handled over private terminals, the cargo handling facilities are specialized and little general or packet freight is handled. On the other two tributary streams, the Cumberland and Tennessee, the type of terminal in a few instances, is equipped for direct river-rail transfer of freight, but in most cases the equipment is simple, being intended merely for loading and unloading freight into and from the river boats and barges, with no need for river-rail transfer. At a great many points on the Cumberland and Tennessee the only sort of terminal facility is a boat landing, either improved or unimproved depending upon the amount of freight passing over it.

Terminal Facilities at Larger Cities

The city of Cincinnati recently completed one of the largest river-rail terminals in the country. It is shown in an accompanying illustration. This terminal consists of a two-story warehouse, offices, loading platform and derrick. There is also an overhead steel bridge unloader for transfering freight direct from barge to railroad car and vice versa.

One of the most modern terminals located on an inland waterway of this country is the new Mead Johnson Corp. terminal at Evansville, Ind., on the Ohio river. This terinal is illustrated in accompanying views. This modern river-rail terminal has connections with all railroads entering the city of Evansville. At present it is served directly by the American Barge line, the Mississippi Valley Barge line and all independent towing operations. The terminal is 285 feet long and 110 feet wide, with a 45-foot overhang from the river piers to the end of the terminal. This enables the spotting of barges either between the piers or beyond the outer end of the piers, permitting direct transfer of freight by the use of cranes.

The warehouse building is constructed of brick, steel and concrete, is fitted with automatic sprinklers, thermostatically heated and is 585 feet long by 150 feet wide. There are double tracks along the river front and a single track on the landside of the warehouse. This trackage system permits spotting 64 cars at one time and insures quick loading and unloading. In addition to rail-water transfer facilities, there are efficient loading and unloading means for transfer between truck and barge and vice versa. In the warehouse there is 19,000 square feet of storage space on one floor. The freight handling equipment consist of two high speed 52-foot span, 10-ton capacity overhead traveling electric cranes, 110 feet clear span runways, electric trucks and tractors and skid platforms. This equipment permits the careful, speedy and economical handling of all types of freight.

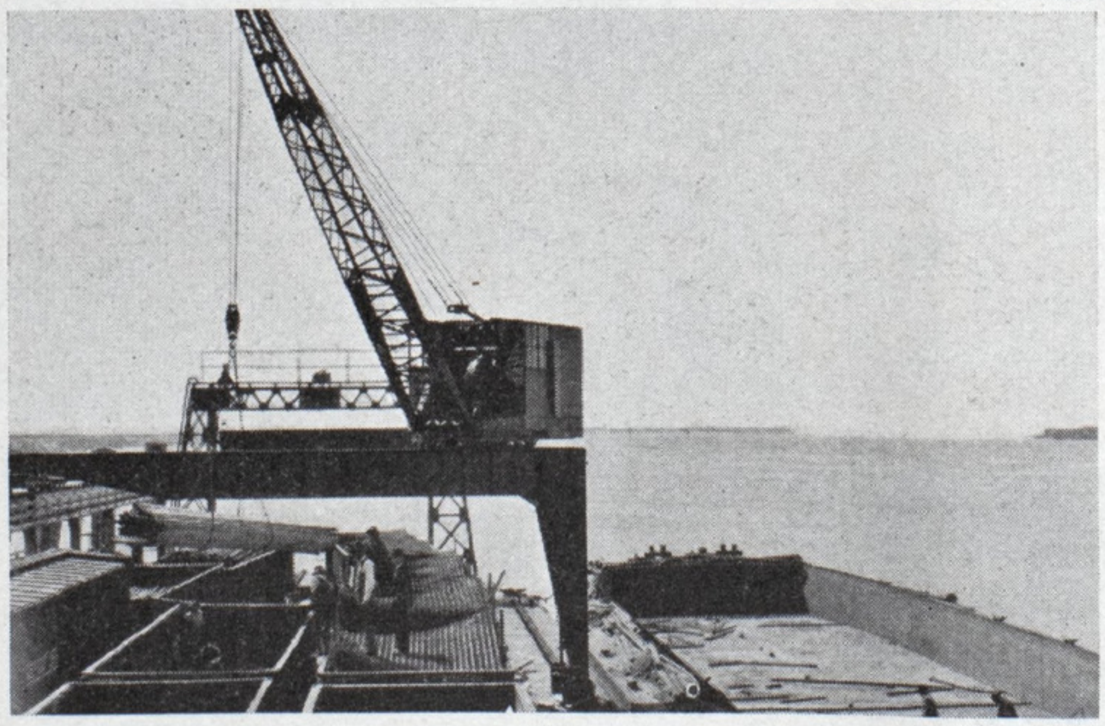
The two cranes in use have a hoisting speed of 60 feet per minutes and a traveling speed of 300 feet per minute. The barges are loaded through the top and cargo is handled on skid platforms. The skid platform is a small wooden structure, 12 inches from the floor, 40 x 64 inches. Three of these wooden platforms are placed on a steel skid platform which is then lowered into the barge through the top by the overhead crane. In the barge, freight is loaded on the three wooden platforms and the steel skid is hoisted either to the track where it is loaded into cars or back to the terminal platform where hand lift trucks pull it into the warehouse.

All commodities are left stored on these wooden skids and the skids themselves are tiered by a power truck. By this method, considerable handling, which would be required if the hand method were used, is eliminated within the warehouse since, as the freight is loaded out of the warehouse upon trucks or cars, the power lift truck raises them off the pier and carries them to the door through which the handling is done. The only labor takes place in the barge, cars or trucks. This terminal is capable of handling steel 108 feet long and any type of freight or commodity. It is one of the most efficient and economical in operation on the rivers.

Terminal Facilities on Mississippi

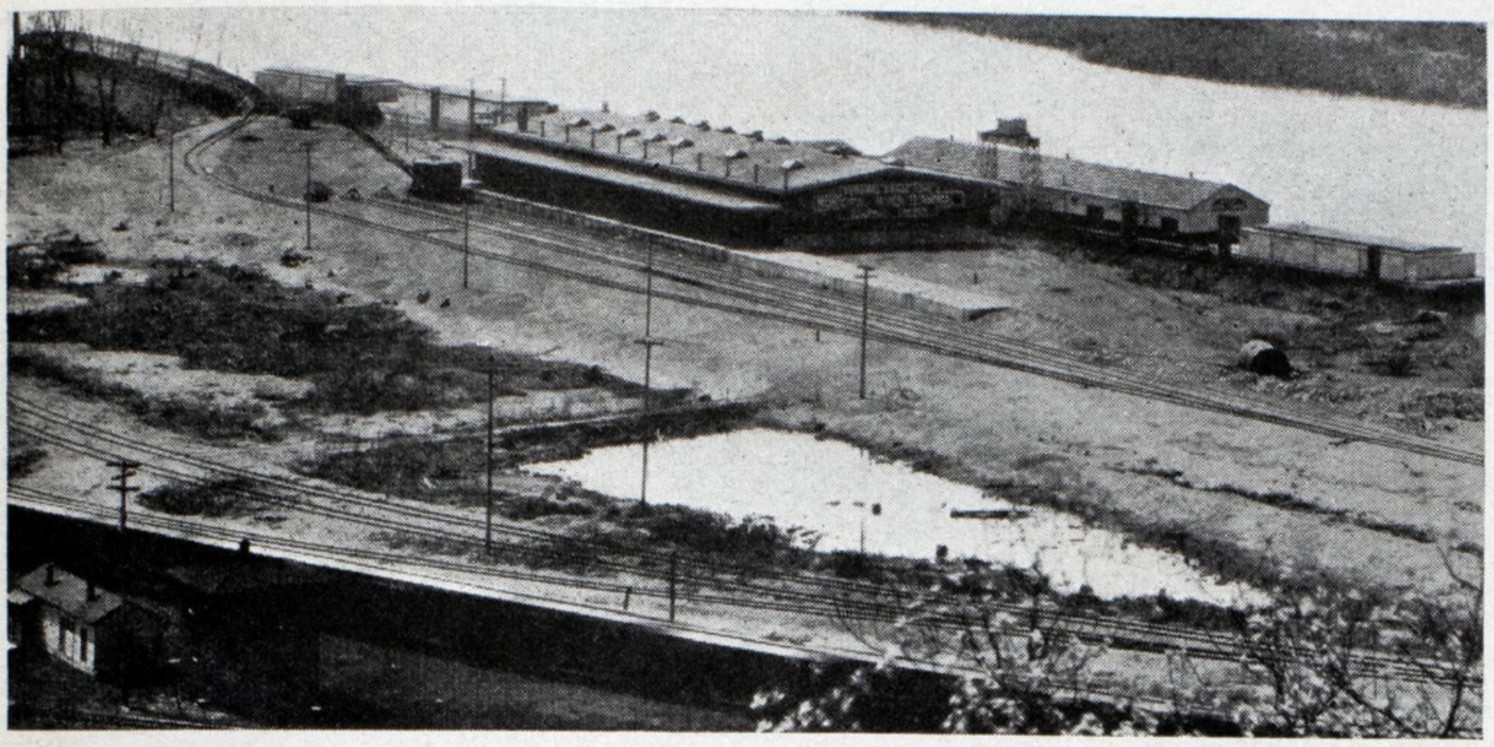
Regarding terminals in operation on the Mississippi river, a description of different types operated by the Inland Waterways Corp. will serve, in connection with accompanying illustrations, to give some idea of their facilities.

At Memphis, Tenn., the corporation operates a terminal of the escalator type for package freight.



Inland Waterways Corp. terminals. Upper—River-rail terminal at Minneapolis with locomotive crane for handling heavy freight between barge and railroad car. Center — A view of the municipal terminal at St. Louis with vertical lift type of equipment for transferring freight from rail to river carrier. Lower—At Baton Rouge, La. Transferring iron and steel

This facility operates on an endless chain incline from wharf boat to warehouse, a distance of 100 feet. The transfer plant in connection with this terminal is the most complete of its type for handling freight between river and rail. This consists of a storage and switching yard with



350-car capacity, a double track incline to a storage yard below, with a car float on the river. There are two cradles for transferring cars from the incline to the carfloat or track barges; also three track barges and two concrete landing barges beside which the boats or barges are moored while being loaded or unloaded.

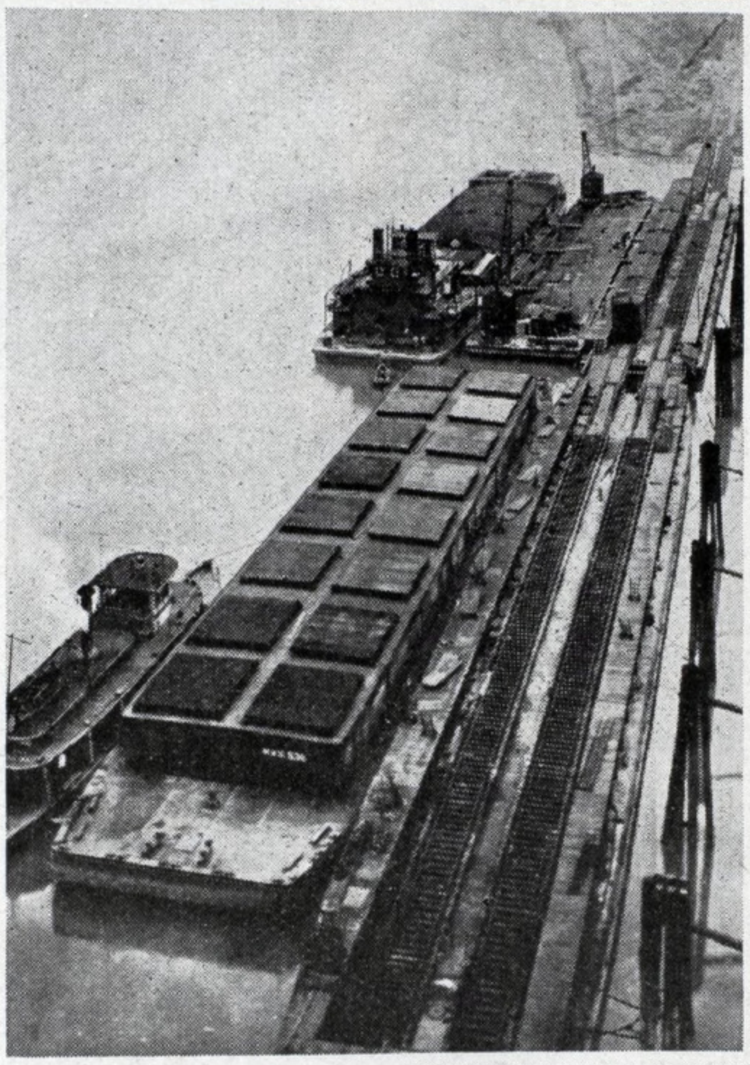
At Baton Rouge, La., the corporation operates a terminal owned by the city and composed of a concrete wharf with a wharf boat and car barge attached. A traveling crane on the river side of the pier is used for transferring heavy freight. The car barge has three tracks and is equipped with a gantry crane for handling freight.

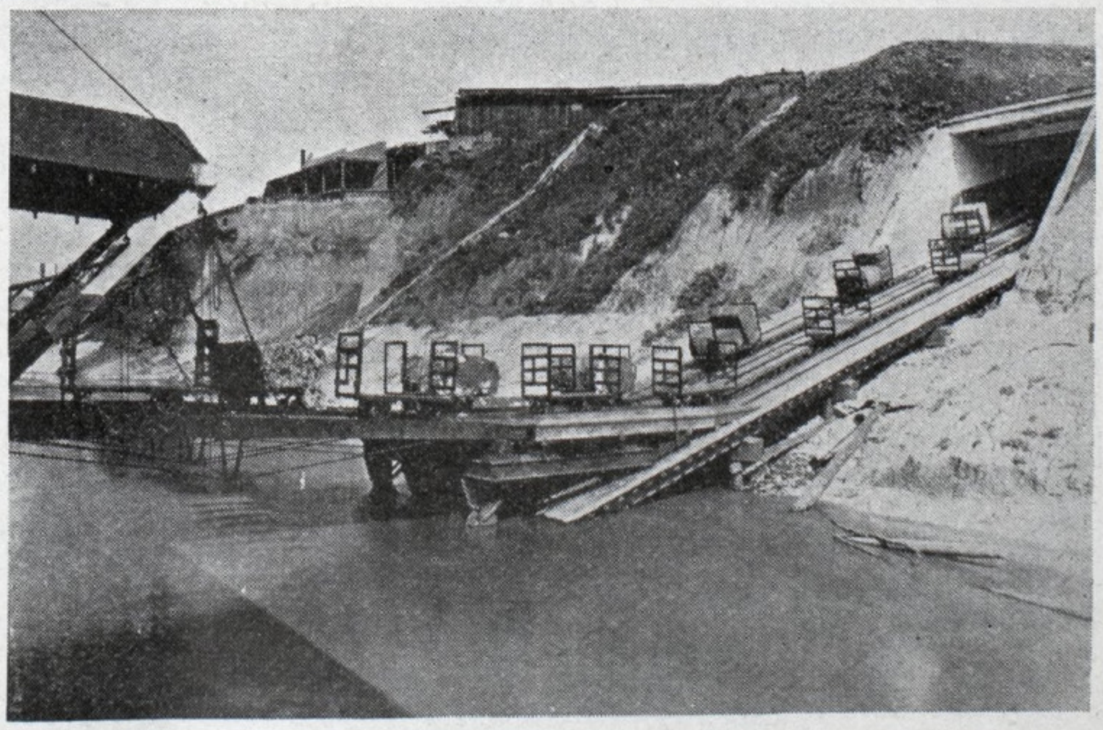
At Helena, Ark., there is a river-rail terminal of the escalator type also operated by the corporation. This terminal consists of a concrete hull wharf boat with an endless chain incline to convey cars to the warehouse and railroad tracks on top of the bank. This provides for transferring freight from boat to cars or vice versa and for storing freight in the warehouse on the top of the river bank for later shipment. At Reserve, La., there is a sugar terminal equipped with chutes for loading sugar. At Vicksburg, Miss., there is a terminal consisting of a floating track barge and an incline.

Grain Terminal at St. Louis

At St. Louis, the municipal grain terminal operated by the Inland Waterways Corp., consists of a concrete dock equipped with tracks for gantry and traveling cranes, switching tracks and warehouse facilities. There are in addition two steel gantry cranes, each gantry carrying two cranes of 5000 pounds capacity. There are also four locomotive cranes in use, a number of grain elevators and a marine leg for unloading grain barges, also connections with all railroads entering the city.

Terminal facilities on the Missouri river are extremely limited, due to the fact that transportation of freight on this waterway has not developed to the extent where extensive terminal facilities are required.





Inland Waterways Corp. terminals. Upper—Municipal river terminal at St. Paul, Minn., operated by the corporation. Center — River-rail transfer terminal at East St. Louis. Lower—Upper terminal at Memphis, Tenn. This terminal of the escalator type is used for handling package freight. It operates on an endless chain incline from wharf boat to warehouse

In recent years considerable interest has been shown by municipalities and other river interests in terminal facilities on the Warrior river system. There are electric cranes for transferring limestone and lumber to barges, derricks for transferring logs from barges to sawmills, and coal from barges to cars and yards; derricks, warehouse and loading hopper for transferring sand, gravel and cement from barges to trucks, hoppers and warehouse; a derrick, warehouse and loading platform connected by a spur track to a city railway system for transferring miscellaneous freight from boats to warehouse or cars or vice versa; gantry crane connected with a railroad by spur tracks for transferring manufactured steel from cars to barges and manganese ore and sulphur from barges to cars.

Terminal facilities on the Hudson river are not adequate to handle efficiently and economically the present traffic. However, such facilities are under construction or contemplated which when completed will be adequate for handling the commerce over this waterway. The state of New York has constructed a barge canal terminal at Troy which is equipped with derricks, a traveling crane and store houses. The state has also constructed a barge canal terminal at Albany. It is intended to construct additional terminal facilities as they are required.

Facilities on Western Rivers

On the Columbia river, between Portland, Oreg., and the mouth, terminal facilities are efficient, general cargo being handled cheaply and quickly. Facilities on the lower Williamette river above Portland have not been required to any extent because most of the down-stream commerce from the Willamette valley is destined for Portland either for local consumption or for trans-shipment, without necessity for transferring freight at intermediate points. Terminal facilities on the San Joaquin river, California, are considered adequate for the existing commerce. These facilities consist of wood wharves, warehouse, landings and sheds with practically no mechanical handling facilities.

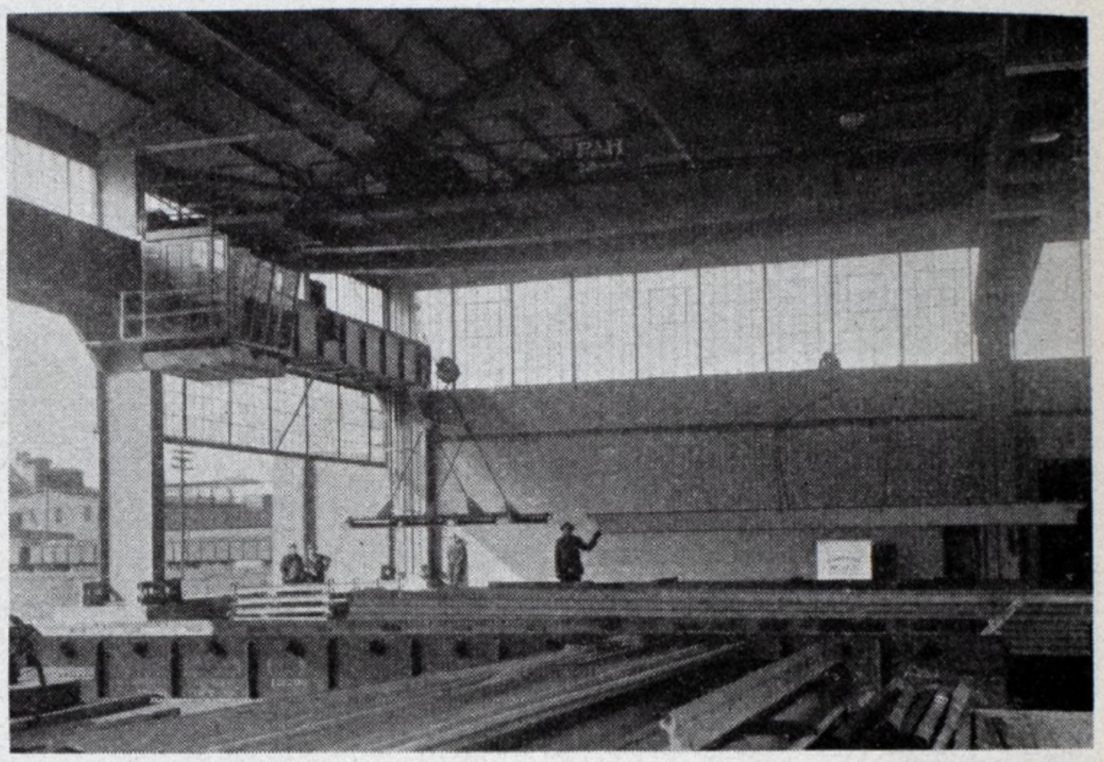
Recommendations have been made by the chief of engineers, United States army for suitable types of terminals for use on the rivers. These

recommendations have been made after a careful study of conditions which are peculiar to the respective waterways, the kind and amount of commerce which would be handled by them and the character of the various rivers themselves determining the type recommended.

Terminals for towns and cities on the Ohio river where a large amount of freight could be shipped, received or transferred should include a two-story building 150 x 300 feet, equipped with four elevators for lowering trucks to the level of the boat or barge deck. Two lines of railroad tracks, connecting with local railroads, should run through the center of the building. A telpherage system should be installed on both floors and traveling electric cranes on the first floor. The principal advantage in this type of terminal lies in the fact that it can be enlarged and extended as increase in traffic warrants.

For cities and towns on the Ohio where the river freight transportation business is conducted on a smaller scale, the same general type of construction is advised, the size of the terminal and the type of mechanical handling equipment depending on the kind of freight which would be handled and the amount of it. A conveyor should be installed where considerable freight of one kind is regularly received.

Cost is naturally an important item in terminal construction. Where the amount of freight does not warrant the expense of a telpherage or other mechanical handling system there should be at least a paved landing, a wharf boat, a warehouse on top of the bank with an incline track between wharf boat and warehouse. There should be a railway siding to the warehouse and a derrick for handling heavy articles. The incline should be as nearly parallel to the river as possible to permit direct transfer of freight between barge and railroad car, regardless of river stage.



General and interior views of new Mead Johnson Terminal Corp. terminal at Evansville, Ind., showing layout of terminal and warehouse buildings, and overhead traveling crane handling structural steel inside the terminal This terminal is one of the most modern river-rail facilities on the Ohio river, employing efficient mechanical handling equipment for all classes of freight

Due to the wide variety of conditions of river and traffic on the Cumberland and Tennessee considerable difference exists between the proper types of terminals for this waterway. Where there is considerable commerce to be handled, there should be a railroad incline connecting the water's edge with all railroads entering the city for direct transfer of freight between car and barge. To accommodate fluctuations in river stage, this incline should be parallel to the river edge. In addition, the larger towns should have a wharf for handling general freight. This wharf should include a warehouse located above high water, and should have incline tramways or some types of elevators for the transfer of freight.

At landings of lesser importance there should be a wharf boat with an improved road leading from it to the top of the bank, the size of the wharf boat depending on the extent of traffic; or, there should be a hard surfaced road from the public highway to low water with two or more warehouses in connection, one for low water and one for high; or, there should be an incline tramway from the water's edge to a warehouse above high water. A definite attempt should be made to establish suitable terminal facilities on the Tennessee since inadequacy of the terminals has resulted in a backward attitude toward transportation over this waterway. With erection of suitable freight handling equipment, the com-

Carnegie Steel Co. Handling Facilities

Location of Terminal	Purpose for Which Used	Description of Loading and Unloading Equipment	Capacity Tons per Hour
Clairton by-product coke works, Clairton, Pa.	Unloading coal from river barges.	Four fixed towers of steel construction with two motor operated hoists per tower. Each hoist equipped with a 6-ton grab bucket.	375 for each hoist.
Coal storage yard, Clairton, Pa.	Unloading coal from river barges to storage yard or cars, or from storage yard to barges or cars.	Steel traveling gantry crane with two 6-net-ton buckets, electrically operated.	180 to 200 (total for two buckets)
Edgar Thomson works, Braddock, Pa.	Loading and unloading various materials incident to steel plant operations.	Steel traveling gantry crane, electrically operated, with one 5-ton hoist.	50
Central wharf, Munhall, Pa.	Loading steel products and cement from cars into barges. Unloading scrap and other materials from barges into cars.	Steel traveling gantry crane, electrically operated, with two 7½-net-ton hoists. These hoists may be operated separately or together as a unit.	85 to 100 (total for two hoists)
Mingo works, Mingo Jct., O., Dock No. 1	Unloading coke from barges.	Fixed steel crane, electrically operated, with one 5-net-ton grab bucket.	350
Dock No. 2	Loading and unloading materials incident to steel mill operation.	Fixed 15-ton steel stiff leg derrick, electrically operated, equipped with one 5½-cubic-yard bucket.	70 to 80.
Lucy Furnaces, Pittsburgh, Pa.	Unloading coke from barges.	Fixed steel stiff leg derrick, steam operated, equipped with one 1.9-ton grab bucket.	80
Isabella Furnaces, Etna, Pa.	Unloading coal and coke from barges.	Fixed steel steam driven whirler equipped with a 5½-cubic-yard grab bucket.	100

Note:—The above table, outlining the efficient cargo handling facilities of the Carnegie Steel Co. at its various plants on the Monongahela, Allegheny and Ohio rivers gives an idea of the type of equipment employed by the large corporations for handling their own products, steel, coal, coke, cement, etc., in and out of barges.

merce over this river would increase since the portion of the country through which the river flows is very poorly served by railroads.

On the upper reaches of the Mississippi river there is a definite need for modern terminals. The type of facility at Alton, Ill., is suitable for cities and towns where considerable freight of all classes is handled. This terminal has warehouse and storage facilities and is adapted for changes in river stage up to 27 feet. Cargo handling equipment consists of one electrically operated loader-unloader, an incline railway and stationary derrick. The loader-unload-

Interior view of the modern terminal operated by the Inland Waterways Corp. at Birmingport, Ala. Efficient mechanical cargo handling equipment adds to the economy of this up-to-date facility. Two small monorail cranes can be seen carrying loaded skids

Interior of the New York pier of the Hudson River Navigation Corp. This pier at the foot of Canal St. in New York City extends 800 feet into the North river and is valued at $3,000,000. The Albany terminal of the line has approximately 1000 feet waterfront

er has a capacity of 1400 packages per hour and on a test handled 600-pound barrels of sand efficiently. It is also well suited to transferring fruit from barge to car, being capable of transferring a carload of apples in 35 minutes.

Another type of terminal recommended by the chief of engineers for the upper Mississippi for which a number of advantages are claimed consists of a warehouse 80 x 150 feet, equipped with an electric freight elevator with a platform 9 x 17 feet, designed for carrying four loaded four-wheel trucks. This load would be equivalent to 10,000 pounds moved at 100 feet per minute. With the river at its lowest stage, the travel of the elevator is approximately 20 feet and under these conditions a round trip is made every three minutes or 20 trips per hour, giving a total capacity of 40 tons per hour in each direction. Where an elevator system is practical this type of terminal has many advantages.

For operation on the Missouri river the type of terminal which is said to give greatest utility at least cost consists of a terminal building 50 x 526 feet and a freight house 46 x 306 feet. The terminal building located at the rear of the wharf rests on a concrete base wall constructed on concrete piles and has a floor storage area of 11,300 square feet. The terminal is fitted with a telpher freight handling system with two lines of runway the length of the building for the operation of a three-ton capacity traveling hoist. This hoist runs out eight feet over the wharf on a cantilever arm of track. A locomotive jib crane with a radius of 35 feet, allowing for a swing of 20 feet over the water and to the rear face of the wharf, operates on a track extending the full length of the wharf. The terminal may also be fitted with incline escalators. This terminal is suited in type to different stages of river and its size and equipment would depend on the amount of traffic at the point where construction is under consideration. If the amount of traffic does not warrant the expense or use of a locomotive crane, some form of escalator or freight handling device should be installed.

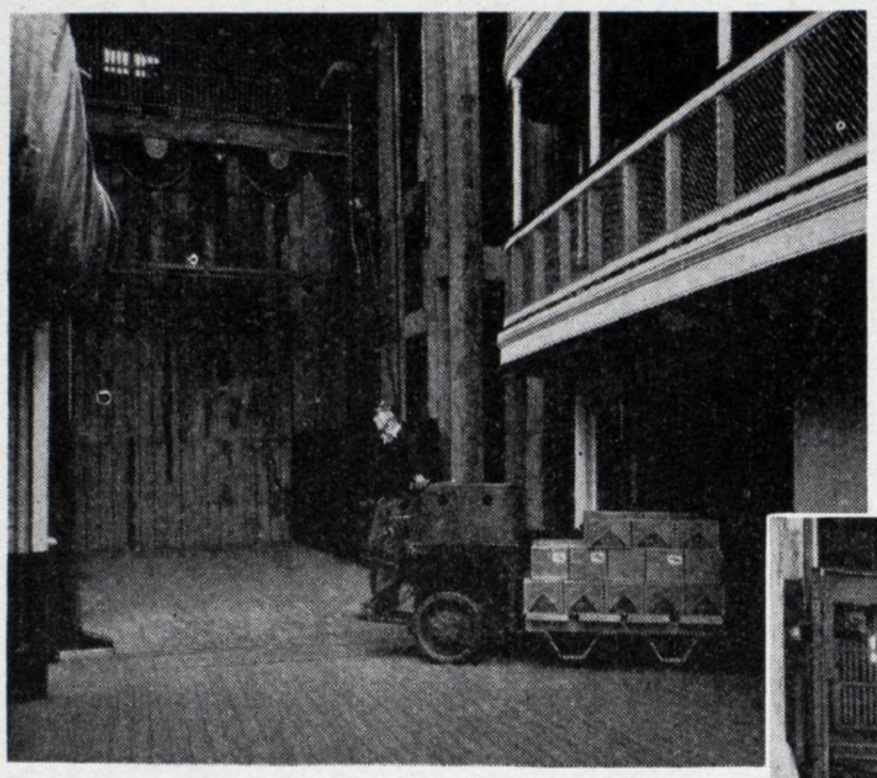
Recommended as being especially efficient and economical for handling miscellaneous freight on the Warrior river system is the type of terminal consisting of a pile bulkhead, a warehouse of sheet steel on a pile foundation about five feet above high water with a concrete or wood block floor. The mechanical handling equipment would consist of an endless chain conveyor capable of being adjusted to varying stages of river; a derrick or traveling crane for handling heavy freight; two sets of tracks, one along the land side of the terminal for spotting cars to be loaded or unloaded at warehouse and one along the river side of the warehouse for direct loading or unloading of barges. This type of terminal could be built in any number of units depending on commerce requirements. Each unit would have a steel warehouse 50 x 150 feet with one conveyor and one derrick or traveling crane.

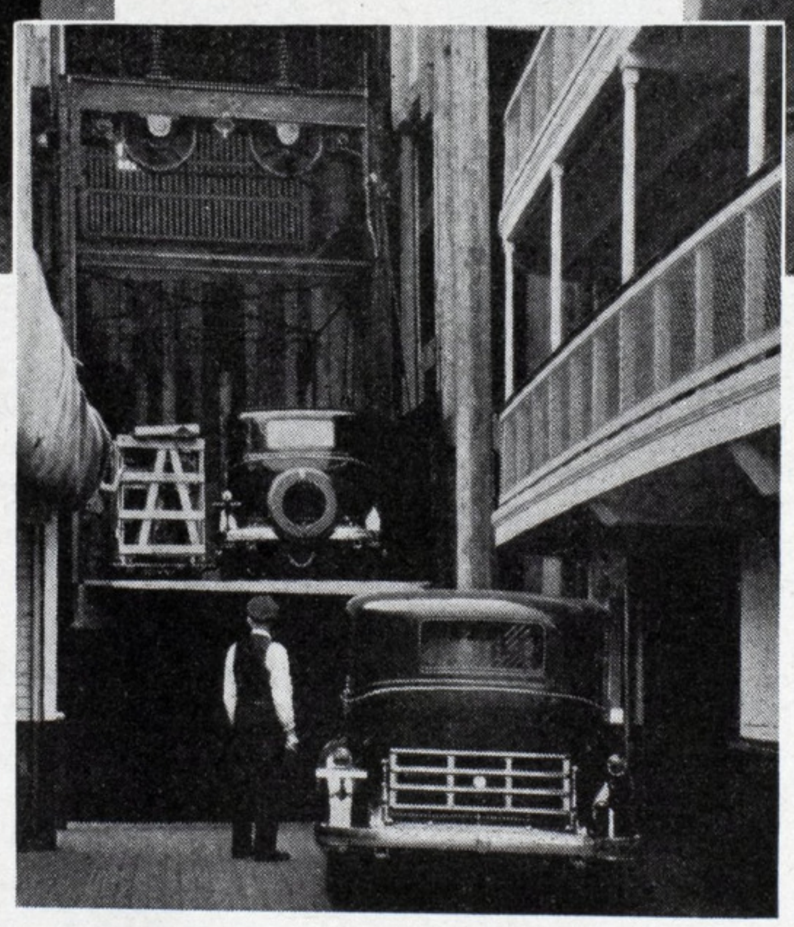
Terminal facilities on the Columbia, lower Willamette and San Joaquin rivers are considered adequate, except more extensive mechanical handling facilities should be installed at various points on the San Joaquin river. On the Sacramento river, the larger towns should have sufficient warehouse space and conveyors or other means of handling freight. There should also be rail and highway connections for transfer of freight. On the upper reaches of the river where protection against floods is necessary there should be two platforms for use in high and low water seasons. With only one platform, located above high water,

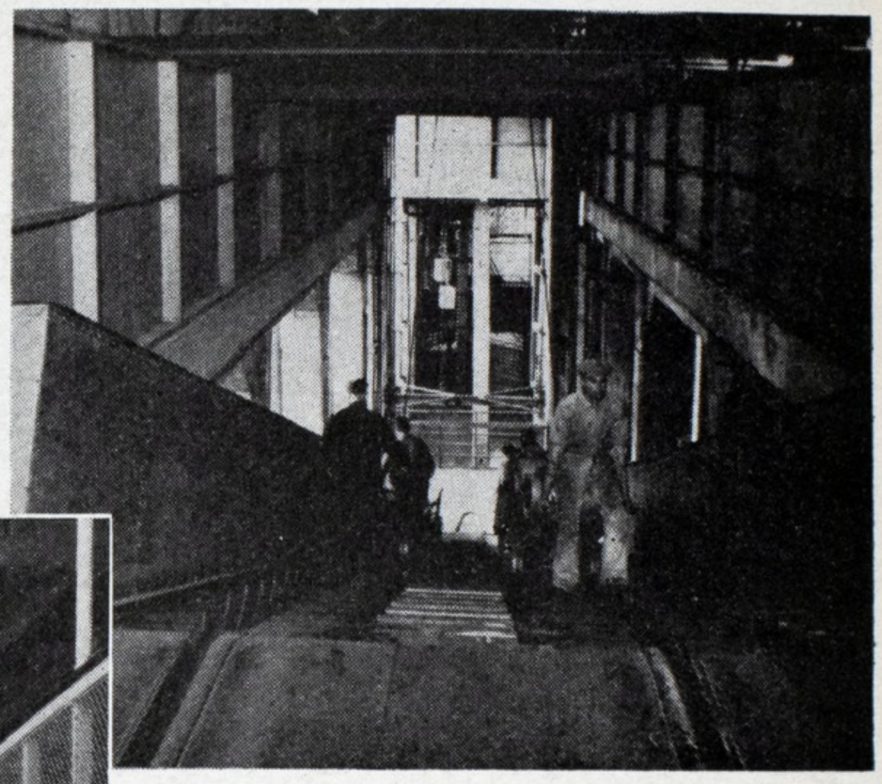
Interior of a transfer barge showing tractors and trailers engaged in unloading freight from a river barge. This type of facility is in general use where fluctuations in river levels require a flexible arrangement between the river barge and terminal

the distance from the wharf to the water at low-river stage ranges between 25 and 35 feet.

A conveyor which would be adapted to conditions on this river would be of the portable type for handling package freight. This would consist of a traveling carriage with three chain conveyors, the first section of which would be mounted on a 45-foot frame pivoted to the carriage and suspended from a boom, so that its outer end could be raised or lowered to suit the deck elevation of the boats or barges. The second section would be located at the rear of the first and would be 20 feet long, extending through the carriage. The third would be an adjustable section, 17 feet in length for handling freight in and out of railroad cars.







River terminal at Sacramento on Sacramento river. Left — Electric truck moving cargo from river boat to electric elevator. Right — Conveyor and hand trucks unloading river boat. Below — Unloading automobiles from river boat to elevators

Photos courtesy Sacramento Chamber of Commerce

A 15-horsepower electric motor is sufficient for operating this machine. The conveyors operate at 80 feet per minute and are capable of handling packages up to 400 pounds in weight.

Good Terminals Would Pay

The possibilities of economy through efficient cargo-handling facilities, on the inland waterways of the country are suggested by the Fay Transportation Co. which operates on the Sacramento river carrying canned goods from Sacramento to San Francisco Bay and sugar and general merchandise in the return movement. This line makes use of modern handling equipment in the form of skids and gasoline lift trucks for loading and unloading. To show the saving of time and consequently the increase in earnings made possible through use of modern cargo-handling facilitites, it is pointed out that this line with its present handling equipment handles 11,000 cases in about three hours whereas formerly when hand trucks were used approximately three days were required for unloading 13,000 cases of canned goods. The vessels which this line operates are diesel propelled barges. Each barge is equipped with a gasoline operated elevator with a platform 10 x 12 feet, the elevator being installed forward of the pilot house. The idea behind the use of the elevator is to compensate for the difference in river stage wherever freight is handled. This is the case everywhere except at Sacramento where a ship side dock elevator is in use.

The barges operated by this company are 145 feet long, 36 feet breadth, with a draft loaded of about 7 feet. The capacity is about 400 tons. About 200 skids are carried. One vessel is equipped with two gasoline lift trucks of 6000 pounds capacity. The other barge in operation is equipped with one gasoline lift truck of the same capacity. Each truck has a lift platform 28½ inches x 54 inches which permits loading from 60 to 75 cases of canned goods per skid, depending on the size of the cases. Before shipment, the cases are loaded on the skids where they remain until they are delivered to a warehouse at San Francisco or Oakland. When loading is taking place, these lift trucks handle about 50 tons of canned goods per hour. Because of the fact that by this method the cases of canned goods are handled less frequently, there is a low cost per ton handled and a great deal less damage.

To point out the difference in work accomplished by hand truck and by power truck, a man working with a two-wheel hand truck will carry on the average about 500 pounds 150 feet per minute. Five seconds will be required by the hand method for picking up and about three seconds for dropping. With the power truck, six to twelve times the amount is handled and the time required for picking up and dropping is the same. Based on a load of 3500 pounds, the power lift truck will handle 196 tons on runs of 100 feet, whereas the hand truck will handle about 11 5/10 tons in the same time and for the same distance.

With a power lift truck carrying a capacity load of 6000 pounds, 336 tons can be handled in an hour. This is approximately 29 times as much as one man is capable of handling with a hand truck. The method employed by this line in handling its cargo could be very profitably used by other lines engaged in inland waterway transportation. Possibly it has little application in the bulk movements, but at places where package freight is carried in short runs this method would undoubtedly be advantageous.

Adequate Terminals Are Needed

Terminal facilities on the inland waterways of this country are hardly adeuqate for existing commerce. This means simply that the terminal facilities are able to load and unload freight from river boats and barges, or to transfer freight from rail to river and vice versa, regardless of time or efficiency. More efficient and more economical methods are needed. Where the old methods of handling by use of hand trucks and so forth, are in use, hundreds of dollars are annually wasted. This waste manifests itself not only in reducing the earnings of the river boat lines, but definitely retards and arrests the development of waterway transportation.

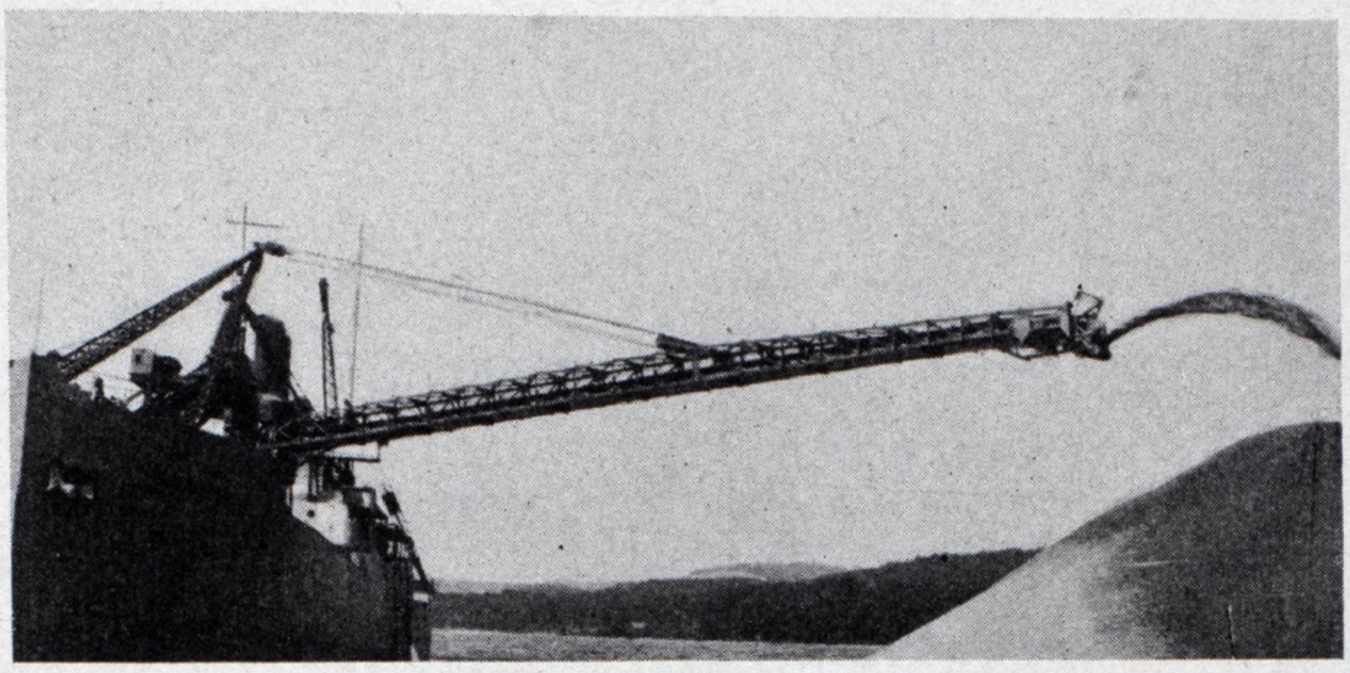
The question of whether or not terminal facilities on any waterway are adequate, is answered most accurately by the cost figures per ton of handling freight. While the cost of installing modern types of terminals and cargo handling facilities may seem unwarranted to river interests, considering the volume now moving, such cost would be absorbed in a few years, while

(*Continued on Page* 62)

Unloader Outreach Increased by Installing Thrower

By Deo Dewsen

THE unloading of and the storage of small aggregates such as sand and gravel present real problems for harbor dredges, that are often difficult of solution. The ordinary type of belt conveyor deposits its load in a pile directly beneath the end of the boom and consequently the storage pile is limited in area by the length of the boom or the closeness with which the vessel can approach the shore.



The Fred W. Green Unloading on Beach at Traverse Bay, Lake Michigan

A unique and satisfactory means of increasing this storage capacity has been adopted by the Northwestern Sand and Gravel Co. in the unloading equipment aboard its freighter FRED W. GREEN. This vessel has a capacity of approximately 3000 tons and is fitted with two derricks each with 2½-yard buckets. These buckets give her a loading speed of between 200 to 400 tons per hour depending on the depth of sand or gravel deposits. These two derricks with their buckets are also used in the unloading process. At times as high as 1000 tons per hour has been unloaded.

Unloading is the reverse of loading, with the added advantage of increase in speed by the shorter haul of the buckets and the use of a 100-foot boom conveyor fitted with a 36-inch wide belt. The buckets first unload upon a horizontal conveyor, which runs along the deck and discharges upon the boom conveyor which is located well forward of the bridge. The boom can be swung and used over a very wide angle, extending from the port side to dead ahead. This location of the boom allows the vessel to unload in practically any locality regardless of depth of water. If the coast is shallow, the vessel can head into the shore and unload, and still have the propeller always in deeper water with no danger of fouling.

While the boom conveyor is 100 feet in length and will deposit the cargo quite a distance from the shore, the equivalent of added length of boom is obtained by means of a Stephens-Adamson heavy duty box car loader installed on the end of the boom conveyor.

This loader consists essentially of a thirty-inch wide belt, nearly eight feet long mounted in a special frame work. The frame is pivoted to the end of the boom conveyor and can be lowered for use or raised out of position by means of a hand winch located on deck.

There is one point in delivery where the water is shallow for nearly one-half mile off shore. To reach this point the vessel takes a start of about one mile with engines wide open and it is practically impossible to stop in exactly the right place. When this happens in order to reach the stock piles, instead of having to unload material in the wrong place or to go to the trouble of lightening, the stacking conveyor is lowered into position and operations are begun after only a few minutes. The belt of the unloader is driven at a speed of 1800 feet per minute by a Westinghouse induction motor. This motor is of the latest type developed for this class of service and is waterproof. It has a normal rating of 10 horsepower at 1750 revolutions per minute when supplied with three phase 60 cycle, 220-volt power. The motor which is totally enclosed is of the standard squirrel cage type with end bells or brackets made of solid material. These end bells are fitted with webs to aid in the dissipation of heat and also to direct the flow of air from the two fan blowers mounted on either end of the motor rotor. These blowers are of cast aluminum construction and are keyed and clamped to the shaft, but so arranged that their removal is easily accomplished. These blowers force air over the stator iron for cooling the motor. To protect the revolving fan blades, and to give added insurance that no foreign material will fall on vital parts, perforated end covers are placed over the ends of the motor. These end bells also enhance the stream lines of the motor, giving it a pleasing appearance. Thus the unloader is equipped with driving apparatus, in which every effort has been made to reduce possible failure to a minimum.

The motor drives the unloader through the medium of a two-strand

---

The author, Deo Dewsen, is a member of the technical staff of the Westinghouse Electric & Mfg. Co.

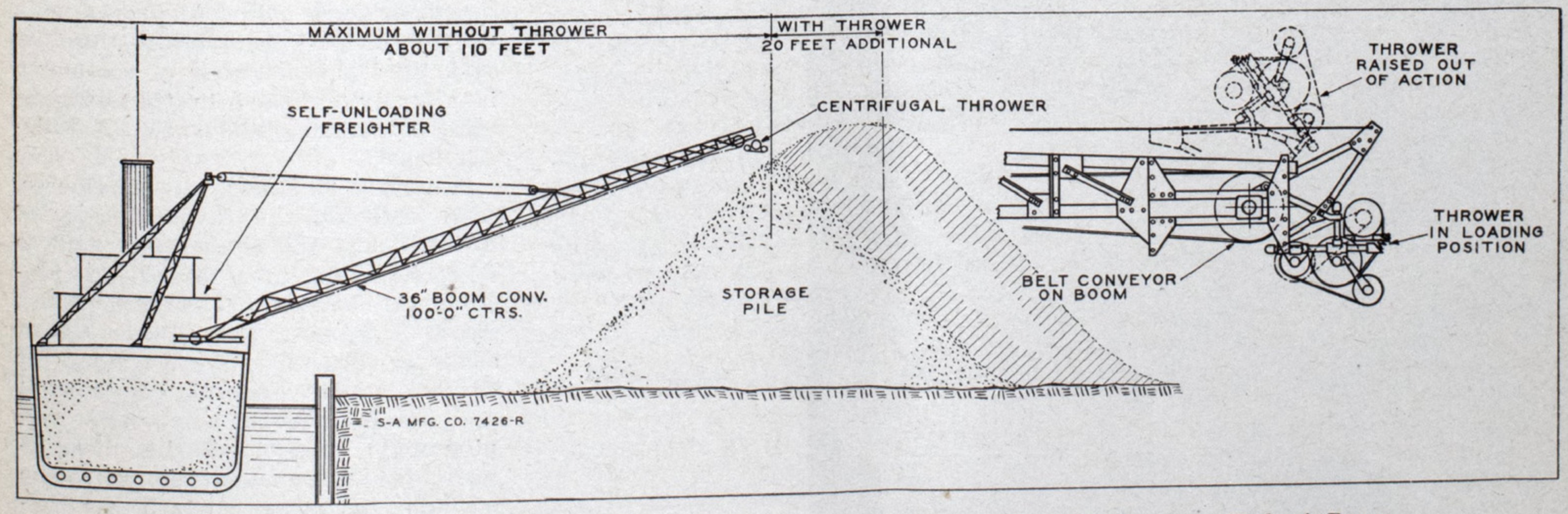


Diagram of Unloader on S. S. Fred W. Green. Upper Right—Detail of Thower on End of Boom

Dayton cog-belt drive with a reduction ratio of a little over 2.5 to 1, which in turn gives the unloader belt a speed of approximately 1800 feet per minute.

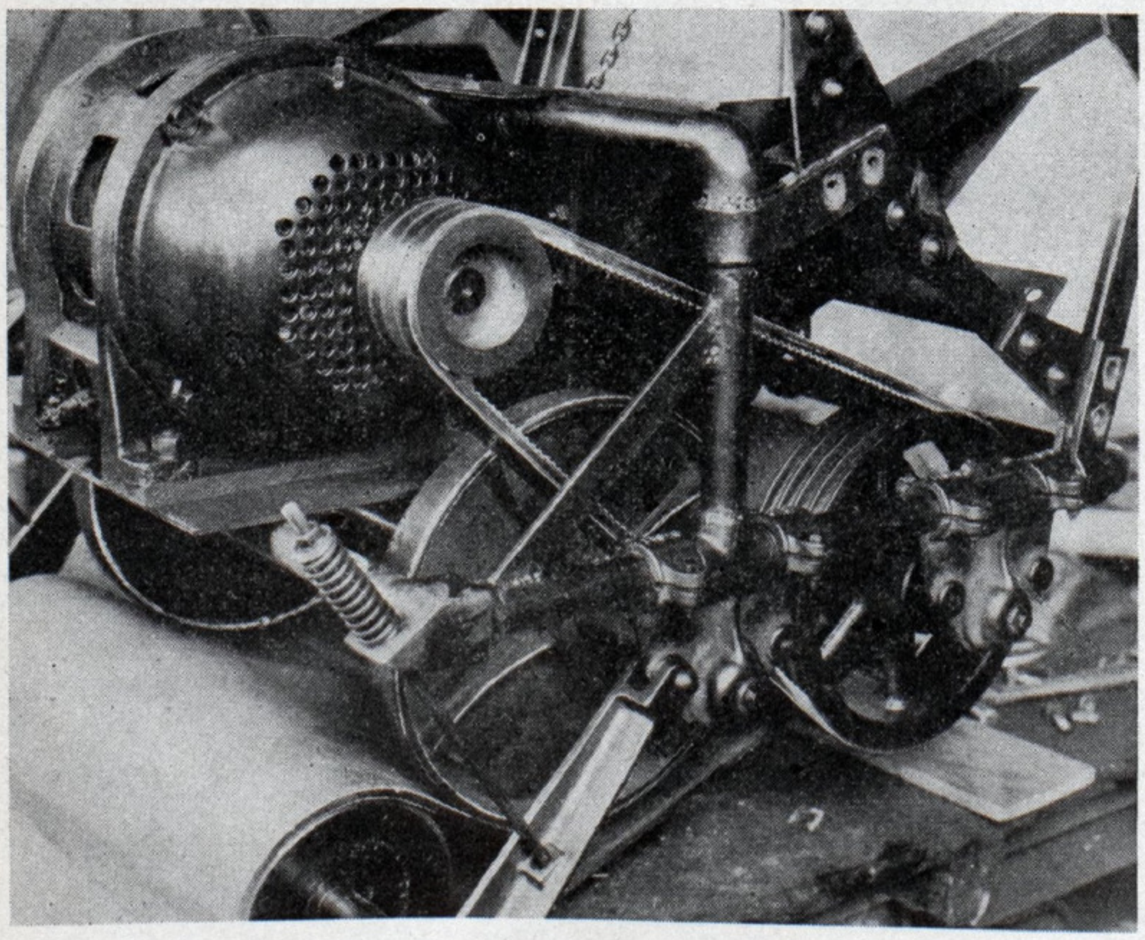
The motor is controlled from the boom of the vessel by a cross-the-line starter. Since the load of the unloader is governed by the amount of material carried by the boom conveyor, no speed adjustment is necessary.

The unloader is mounted on the boom end and so pivoted that it can be raised out of position when necessary. This is accomplished by means of a Stephens-Adamson hand winch located on the boom. Under normal conditions the material would drop from the end of the boom conveyor, but with the unloader in place, the material drops upon the moving belt of the unloader, which throws it away from the boom to a distance of 30 to 50 feet. This method, in reality, gives the equivalent of 35 feet extra boom, at a greater saving in weight and operation. At the same time, it increases the facilities of sand and gravel storage piles.

This type of equipment is adaptable to present freighters, sand and gravel boats or land systems, where existing boom conveyors are inadequate and the expense of longer booms is not justified. The unloader is relatively lighter in weight than the extra length of boom, is flexible in its operation and relatively inexpensive to operate.

The accompanying illustrations which were furnished through the courtesy of the Stephens-Adamson Co., will give some idea of the appearance of the units and their method of operation.

The Todd Shipyards Corp. recently added to the equipment of its Clinton plant in Brooklyn, facilities for supplying vessels with 200-225 volt direct current. This service is available 24 hours a day and is of sufficient capacity to take care of all "in port" operations.



Heavy Duty Box Car Loader Used as a Thrower on the End of the Boom Conveyor on the S. S. Fred W. Green

Recommend Measures To Reduce Fire Hazards

Fires in piers and wharves involve an average loss of between $100,000 and $200,000 per fire, compared with an average loss per fire in all classes of property of approximately $1000, according to statistics compiled by the committee on piers and wharves of the National Fire Protection association.

Recommended measures to reduce this disproportionately high fire hazard were outlined by Charles H. Fischer, New York consulting engineer and chairman of the N.F.P.A. technical committee on piers and wharves, before the thirty-fifth annual meeting of the association in Toronto May 11 to 14. The report of the committee, which he presented for ratification, was based on several years' study of the problem, and embodied a number of revisions in the N.F.P.A. code of standard regulations for pier and wharf construction.

The recommendations included non-combustible construction, complete automatic sprinkler protection, and the restriction, of areas open to the sweep of fire, with particular emphasis on the subdivision of underdeck space where wooden piling may be used. The modern type of steel and concrete pier with steel columns and girders is now accepted as good practice when provided with standard automatic sprinkler protection, the previous requirement for concrete or other fireproofing for steel members being waived.

Among the many typical fires studied by the committee in the formulation of its report was the fire in the Rhode Island state pier in Providence, which occurred on Feb. 25. The superstructure of this pier was equipped with sprinklers, but the fire originated in the wooden piling where it could not be reached by hose streams. After five or six hours the piling burned through and the superstructure collapsed with a resultant total loss estimated at $500,000. The recommendations are made to eliminate such losses.

Many Applications Are Received by Academy

Before the passage of the Jones-White act, which is doing so much to rebuild the American merchant marine, L. F. Loree, then president of the chamber of commerce of the state of New York, and C. T. Gwynne, executive vice president of that body, analyzed the American merchant marine situation and found that it would do little good to build up a modern merchant marine without providing facilities for a modern education in the merchant marine profession. The nautical schools then engaged in this education were antiquated, inadequate and poorly supported. Under Mr. Loree's leadership the chamber of commerce has reached the following decisions:

1. The name of the New York State Nautical school should be changed to New York State Merchant Marine academy to define more clearly its mission (this has been done).

2. A modern ship should be provided for training purposes to enable the cadets to gain a more thorough knowledge of modern ship operation (this is now being effected by the governor of New York in cooperation with the navy department. The NEWPORT will soon be replaced by the U. S. S. EMPIRE STATE, a modern cargo carrier provided with ample quarters for cadets).

3. That a shore base should be provided with proper dormitories, class rooms, laboratories, modern electrical, radio and steam equipment, ship and boat basin and athletic facilties; and that this base should be close to New York in order that the student body may receive practical instruction in cargo handling, engineering overhaul, etc., on ships at New York piers. The governor has made requests for a portion of Fort Schuyler on the East river and the chamber of commerce is actively engaged in the work of obtaining this greatly needed academy base.

4. The chamber of commerce, well knowing the federal policy of not entering the educational field to educate young men for private professional careers (at West Point, Naval academy and Coast Guard academy the students are trained for careers under federal employment and not for private commercial employment) supported the developments of the present state marine schools to meet modern requirements.

Discussing Ocean and Inland Marine Insurance

WORLD trade in 1930 was handled on ocean trade routes at a cost of approximately $1,200,000,000. Premiums for marine insurance entering into this figure contribute no small part of this huge bill," stated Alan M. MacIntire, assistant treasurer of the United Fruit Co., in opening his discussion of marine insurance at the insurance conference of the Ameriman Management association in Chicago, April 27.

Marine insurance is usually considered as describing that form of indemnity covering in those cases where the property insured is transported by water at some time during the course of transit. It applies on all-water shipments but in addition to these a marine form of policy is used to cover in many instances where no water transportation is intended. A marine insurance charter in this country permits the issue of policies for fire insurance, shipbuilder's risks, tourist baggage floaters, inland transportation, parcel post and registered mail insurance and all types of automobile coverage with the exception of liability.

Mr. MacIntire confined his discussion almost entirely to the insurance of merchandise. "The open cargo policy is available to any merchant who makes many shipments in the course of the year," said the speaker in describing the types of policies used. "All goods intended for shipment are automatically covered. He is required to report each movement but his failure to so report before the merchandise is actually in transit does not invalidate his policy if the form is correctly written. Such contracts, whether written for the merchant or for the carrier, attach and cover the goods for the entire period they may be at risk by vessels and connecting conveyances by land and water and cover continuously until safe delivery to the store or warehouse of the consignee at port or place of final destination. They also cover during inland transportation and while awaiting shipment, transhipment, reshipment and delivery, including risks while on docks, wharves, or in lighters, and in appraisers' stores and custom houses for examination."

The payment of additional premiums to provide coverage for risks other than the perils of the sea was also given considerable attention. Clauses covering theft, pilferage, breakage, leakage, world-wide war risks, strikes, riots and the return shipment of undeliverable goods were described and instances where they had prevented loss to the shipper were cited.

The applicatioin of marine insurance to include risks arising from the use of inland waterways, railroads, motor vehicles and aircraft carriers was also covered by Mr. MacIntire.

Inland marine insurance was divided into two classes by the speaker: commercial coverages and personal coverages and various types of policies falling in the first group were discussed at length.

"In point of general interest I think the merchandise transportation floater takes first place," said Mr. MacIntire. "Shippers lose thousands of dollars annually on goods handled by carriers, whose liability is limited and based on negligence. The burden of proof of negligence is placed on the shipper. Furthermore, the value of one load of merchandise very often exceeds the value of the conveyance, which, in the case of motor trucks, may represent the entire assets of the truckman. A transportation policy can be so written as to provide complete protection. This protection is in effect from the time the goods are shipped from the owner's premises until they are delivered to the consignee while in the custody of common carriers in course of transit. These common carriers may be railroads, express companies, public truckmen and transfer companies as well as coastwise and inland steamship lines."

Parcel post policies and registered mail insurance were described briefly and then Mr. MacIntire passed on to salesmen's floater policies. "These policies," he added, "are drawn up to cover samples of merchandise including the trunk, bag or other container while in the custody of the assured or his representatives and while en route by railway express to and from the salesmen wherever they may be located in the United States and Canada. These territorial limits may be extended by agreement. The property is also insured while in custody of any railroad, railway express, transfer and/or transportation company, and/or any steamship, and in automobiles of the assured or their salesmen, and/or while in any hotel, dwelling and/or business building, except on premises of the assured or at those locations where the assured's salesmen may have permanent offices or salesrooms and also where specific insurance is carried. Several different forms are available to meet individual requirements."

In closing Mr. MacIntire pointed out the importance of selecting reliable carriers as a means of securing low rates. "The cost of your marine insurance depends on the judgment rating of your underwriters. The loss record, responsibility, personnel and degree of care exercised in the handling of cargo by the carrier has a direct bearing on this cost. Low rates go hand in hand with low losses—if you specify a transportation company with a reputation for careful handling you will benefit. One American steamship company in 1930 handled some 28,000,000 packages of cargo with damages of less than 1 per cent of the freight revenue."

Standing Committee Holds Its First Meeting

The national standing committee on the merchant marine, appointed by Chairman T. V. O'Connor of the United States shipping board under authority granted last January by the fourth national shipping conference, held its first meeting in Washington on April 24. The meeting was devoted exclusively to organization and methods of procedure. Mr. O'Connor was unanimously elected permanent chairman, and the following sub-committees were appointed:

Methods of increasing patronage for American ships: H. B. Walker, chairman, Malcolm M. Stewart, J. C. Rohlfs.

Adequate mail pay for high speed ships: Ernest Lee Jahncke, chairman, H. G. Smith, H. B. Walker.

Government aid to ships not benefited by mail contracts: J. C. Rohlfs, chairman, J. T. Lykes, H. B. Walker, Malcolm M. Stewart.

Foreign competition in indirect trade: H. B. Walker, chairman, Malcolm M. Stewart, Robert C. Tuttle, J. C. Rohlfs.

Safety of marine workers: Robert C. Tuttle, chairman, George A. Marr, J. T. Lykes.

Panama canal tolls and measurement: J. T. Lykes, chairman, J. C. Rohlfs, H. B. Walker.

Safety of life at sea: T. V. O'Connor, chairman, H. B. Walker, H. G. Smith.

Proposals of railroads for ownership of water carriers and regulation by the interstate commerce commission: H. B. Walker, chairman, J. C. Rohlfs, Malcolm M. Stewart, George A. Marr.

Construction of naval vessels in private American yards: H. G. Smith, chairman, T. V. O'Connor, J. C. Rohlfs.

Cost differential in the operation of United States vs. foreign ships: H. G. Smith, chairman, T. V. O'Connor, H. B. Walker, Robert C. Tuttle, J. C. Rohlfs.

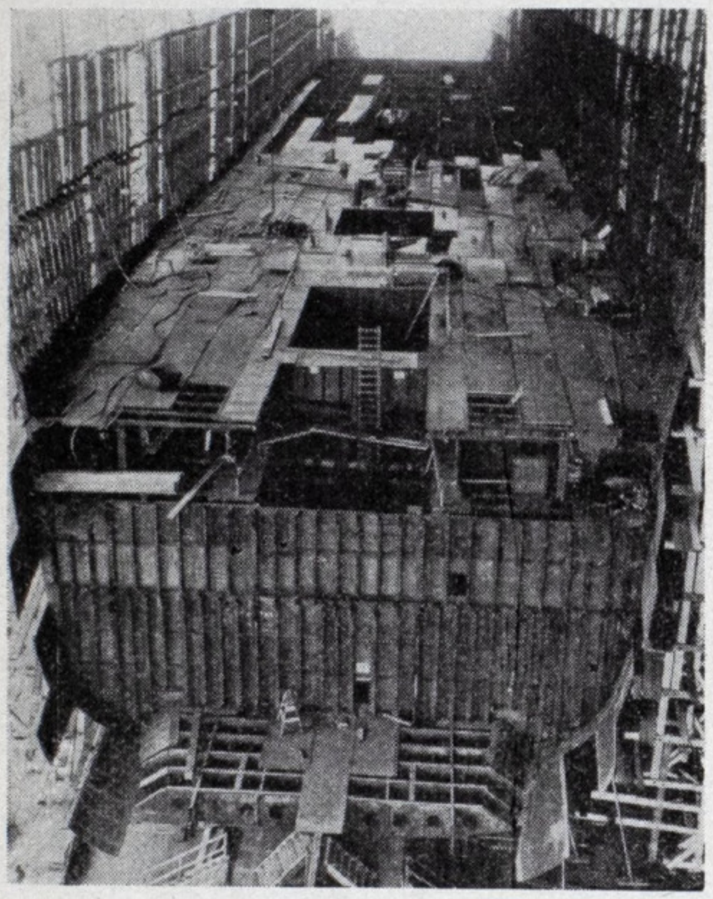
The above sub-committees were authorized to obtain information.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

THE accompanying illustration made from a photograph taken the middle of May, shows the first of the 30,000-ton liners building by the New York Shipbuilding Co., Camden, N. J. for the United States lines. Work on the two vessels is being advanced to permit launching the first in December, and the placing of it in operation by May 1932. The second vessel will be ready for service early in 1933.

Approximately 1600 men are engaged in the construction of these two vessels which are the largest ever built in this country, and when completed will cost approximately $20,000,000. They will be 705 feet long overall and will have accommodations for about 1300 passengers. Their cruising speed will be more than 20 knots.



First of new 30,000-ton liners for United States lines building at Camden, N. J.

Contract for Two Vessels

Contract for the construction of a new all-steel automobile ferry boat was awarded May 1, by the Wilson line to Pusey & Jones Corp., Wilmington, Del. The new craft, built especially for the line's service between Newcastle, Del., and Pennsville, N. J., will be ready for operation the latter part of this summer.

Space will be provided for the transportation of 75 automobiles. Its dimensions are 206 feet long, 58 feet beam and 16 feet deep. The contract price was $350,000. With the new ferry boat the company will have four vessels in service between Delaware and New Jersey.

Another contract let by the Wilson line to the same shipyard was for the reconstruction of the steamboat CITY OF WASHINGTON, recently damaged by fire at Wilmington. Repairs will cost approximately $150,000. The CITY OF WASHINGTON, which operates on the Wilson line's Potomac river service between Washington, Chaple Hill and Colonial Beach, will be ready for service June 20.

Work on both contracts already has started.

Steel Contract Awarded

The Central Iron & Steel Co., Harrisburg, Pa., recently was awarded a contract to supply the United States navy with 3500 to 4000 tons of steel plates to be used in reconditioning two battleships, the NEW MEXICO at the Philadelphia navy yard and the MISSISSIPPI at the Norfolk navy yard.

Truss-Weld Barges

The steel truss-weld barge N. A. D. Co. No. 1, first hull of this patented construction to be built by the United Dry Docks, Inc., was launched Tuesday, May 19, at the company's Staten Island plant. The barge measures 60 feet x 20 feet x 6 feet and has a capacity of 35,000 gallons of fuel oil. It is of electric lapwelded construction in its entirety and was built for the Atlantic, Gulf & Pacific Co., New York, to be used as a tender for the dredge SCROD of Boston. Two derrick barges are also under construction.

The derrick barges, both 60 feet by 30 feet by 6 feet deep will be launched early in July. All three vessels will be typically representative of the truss-weld system of hull construction. Instead of the usual frames, ribs and beams they will have an internal structure of angle iron trusses, the members running longitudinally, athwartship and vertically, all welded at intersections and to the skin of the hull.

Steel truss-weld barge built by United Dry Docks Inc., for Atlantic, Gulf & Pacific Co.

New York Shipbuilding Co. Low Bidder on Submarine

The New York Shipbuilding Co., Camden, N. J., was low bidder on a contract for the last of the nine fleet submarines authorized by congress in 1916, the department of the navy announced May 19, with a bid of $3,150,000 for construction within 30 months.

Three bids were submitted by Electric Boat Co., Groton, Conn., the only other bidder, for construction within 30 months. The bids ranged from $3,297,000 to $3,395,000 and were entered under two different classes.

The New York Shipbuilding Co., bid was entered under Class 2, with the submarine to be built to the design prepared by the department and the machinery to be provided by the department. The first Electric Boat Co. bid, $3,297,000, was for the submarine to be built to the department's design for both hull and machinery. The same firm also bid $3,297,000 for one design and $3,395,000 for a second design under the class where the contractor designs the hull and the department designs the machinery.

The submarine CUTTLEFISH will be 1100 standard London treaty tons, a reduction from the size specified in the original design which had called for a surface displacement of 1550 tons. Six of the group of nine so-called V-type fleet submarine authorized 15 years ago are already in service, while the other two are under construction at Portsmouth, N. H., navy yard.

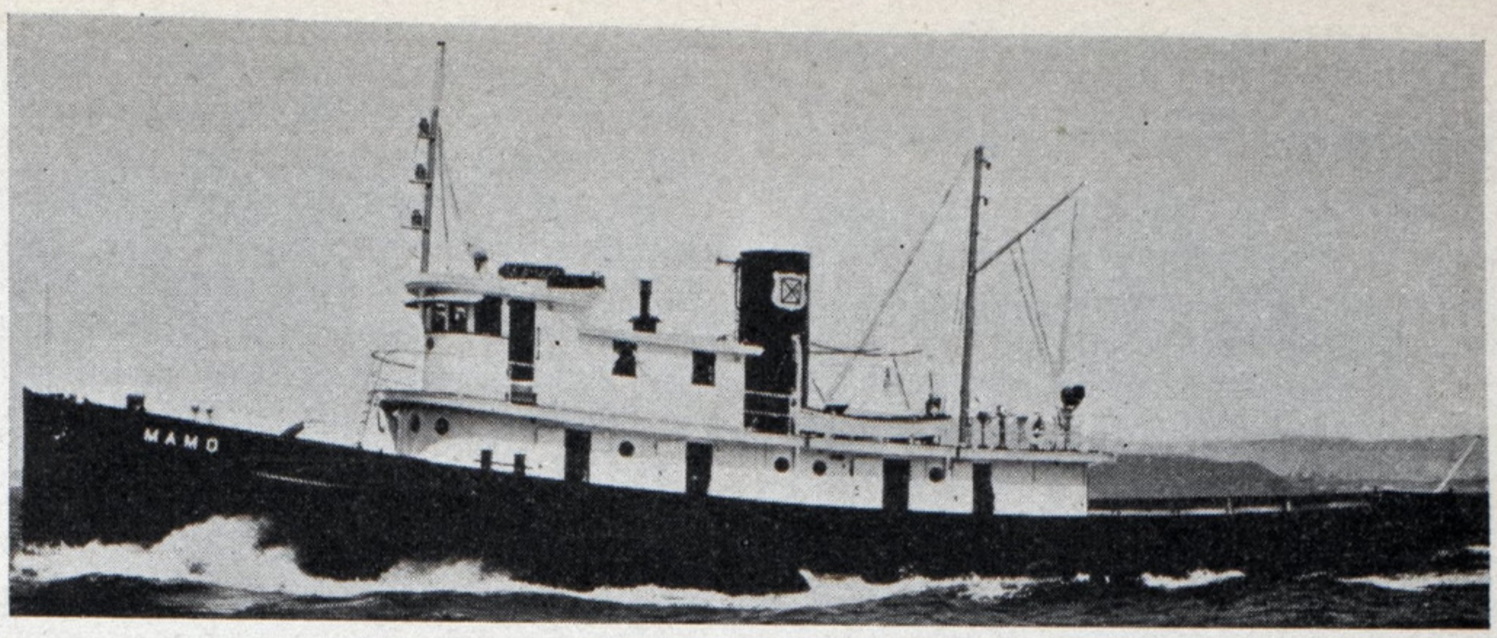
Build Powerful Diesel Tug at West Coast Yard

On April 9, the new diesel tug MAMO, built at San Francisco by the Bethlehem Shipbuilding Corp. for Young Bros., Honolulu, arrived at that port after a shakedown voyage of 10 days and 15 hours. This tug is one of nine operated by the owners in Hawaiian waters.

The MAMO, one of the most powerful tugs operating on the Pacific, is twin screw, 129 feet long, 28 feet beam, with a draft of 11 feet 6 inches. She is powered with two 750-horsepower Fairbanks-Morse diesel engines. In adddition to the main propelling units, there are two diesel auxiliary units also Fairbanks-Morse.

Quarters for officers and crew are spacious and comfortable. The captain's quarters are located on the boat deck with an additional stateroom adjoining. The officers' mess is on the main deck, starboard side. Galley and crew's mess are immediately abaft the officers mess.

The MAMO was designed by L. H. Coolidge, Seattle naval architect and marine engineer.



New 129-foot tug Mamo built by Bethlehem Shipbuilding Corp., San Francisco

Deisel Electric Dredge

The Sternberg Dredging Co. of St. Louis is the latest inland shipowner to apply electric drive to its vessels. A 150-foot, combination hydraulic and clamshell dredge of the tunnel stern propeller type, is now being built for that company by the Nashville Bridge Co. of Nashville, Tenn., and the new dredge will be self-propelled by diesel electric drive.

This company has a number of dredges in service now, including one electric dredge operated from shore power, but the new boat will be the first to be electrically propelled. Electric equipment for both propulsion and auxiliaries is being built by the General Electric Co. The dredge is expected to be completed late this summer.

The power plant will consist of two Busch-Sulzer diesel engines each driving a 1000-kilowatt alternating-current generator rated 2300 volts, 3-phase, 60 cycles, with direct connecting exciters. The two propellers will be driven by 300-horsepower, 600 revolutions per minute motors through belt drive.

Diesel Electric Tender

The Moore Dry Dock Co., at its Oakland Works, is building a 121-foot vessel, the COLUMBINE, for lighthouse service of the department of commerce service, and it is expected to go into service early this fall.

Diesel-electric propulsion will be used on the new boat, equipment being furnished by the General Electric Co. The power plant will consist of two 240-horsepower Atlas-Imperial diesel engines driving two 100-kilowatt, 500 revolutions per minute, 250-volt, compound-wound, direct-current generators. The single screw propeller will be driven by a 240-horsepower, 350-revolutions per minute, 500-volt, double-unit motor. Rheostatic control will be used.

The vessel, a duplicate of the lighthouse tender, LINDEN, will have a specified speed of 9½ knots. There will be accommodations for 16, including officers and crew.

Bids for Oil Barge

Bids were opened May 15 at the Vicksburg, Miss., United States engineer's office for the construction of a steel oil barge 80 feet long, 26 feet beam and 6 feet depth.

Sealed bids, in duplicate, subject to the conditions, will be received until 12 noon June 23, 1931, and then publicly opened, United States engineer office, New York City, for furnishing all labor and materials and performing all work and delivering afloat, one 50-foot, steel hull motor driven tug, in New York harbor.

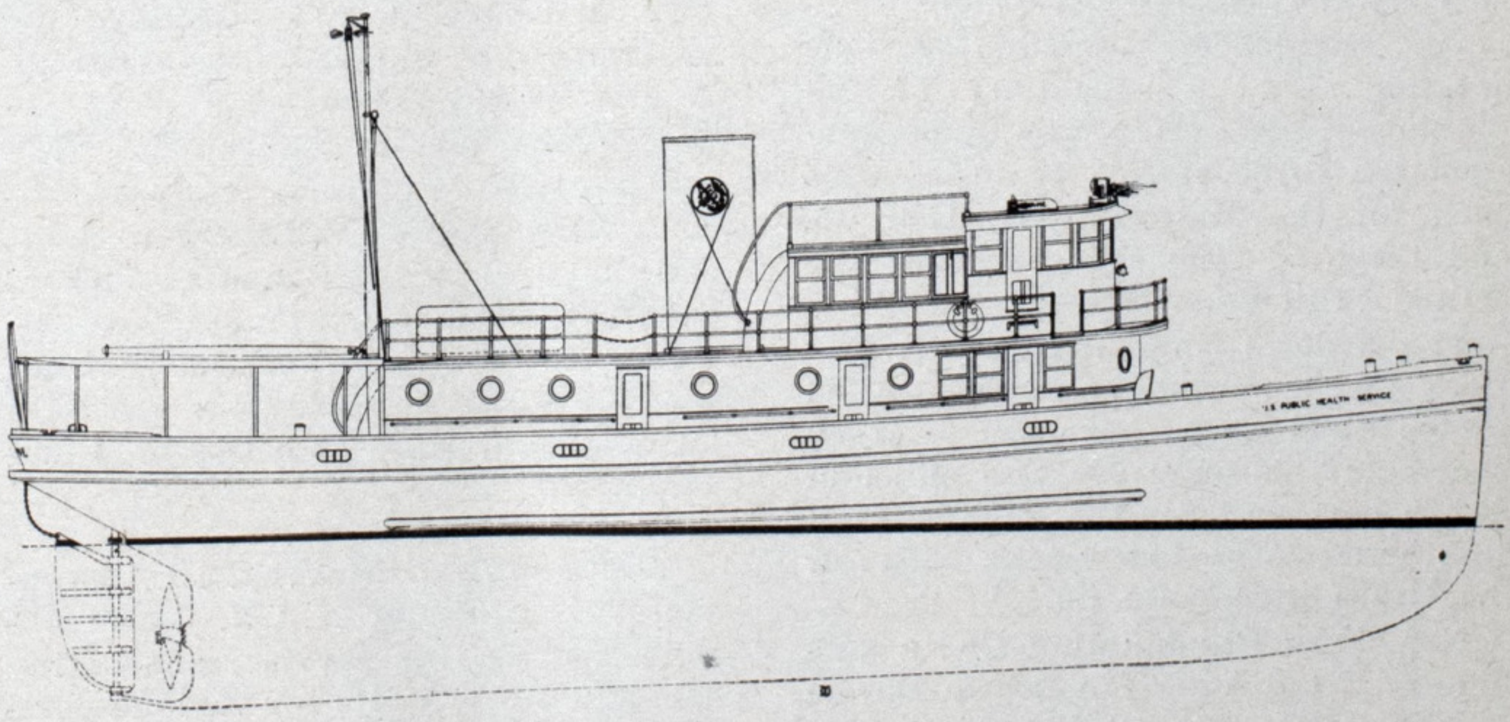
Contract for 30 Barges

Contract for the construction of 30 standard coal barges for the Warner Coal Co., Cleveland, has been awarded to The Dravo Contracting Co., Pittsburgh, Pa. These barges each will have a length of 175 feet, a beam of 26 feet and a depth of 11 feet, with a capacity of 1000 tons each. The barges will be used to transport coal from the Warner company's mines on the Kanawha river to Cincinnati, O. The contract involves approximately $500,000.

New Quarantine Tugboat

A new diesel electric boarding tug is now being constructed by the Spedden Shipbuilding Co. Inc., Baltimore, for delivery about the end of March, 1932. This vessel is being built for the foreign quarantine division of the public health service and will be attached to the United States quarantine station at Rosebank, Staten Island, New York, where her chief function will be the transportation of public health service doctors from quarantine to ships entering New York from foreign ports for the purpose of inspecting passengers and crew.

The vessel which was designed by P. W. Clark, naval architect, Washington, is 100 feet 8 inches in length overall, 22 feet molded beam and her draft loaded will be 11 feet. She will be propelled by two 325-horsepower Fairbanks, Morse & Co. diesel engines each driving 205-kilowatt Westinghouse generators which will furnish current to the Westinghouse main electric propulsion motor developing 500 horsepower at 175 revolutions per minute. The Columbian propeller will be designed for a speed of 12 knots.



Diesel electric boarding tug building by Spedden Shipbuilding Co. for foreign quarantine division of the public health service

New Work in Five Largest Shipyards Summarized

Statistics as of May 1 indicate that the five largest shipyards were building 22 merchant vessels of the combination passenger and cargo type and five bulk oil carriers, of approximately 321,900 tons gross. At the beginning of this year 18 merchant vessels and eight tankers were under construction, but their combined tonnage was only 306,100. Since that time, several of the ships were launched and contracts for larger vessels placed.

Of the new vessels definitely required to be built under the provisions of the ocean mail contracts, seven have been delivered and 31 are to be built within the next few years. In addition, 33 ships now in operation must be reconditioned or replaced with new tonnage.

The dollar value of unfinished work in the country's shipyards as of May 1 approximated $61,000,000 for merchant vessels and $32,000,000 for government vessels. Comparative figures for Jan. 1, were $65,000,000 and $25,000,000, respectively.

On the basis of unfinished work, the shipbuilding industry is operating at about 50 per cent of normal capacity. The number of men employed by 20 of the coastal shipyards, which includes all the yards equipped to build seagoing vessels, was 17,500 on May 1. Some of the men were engaged in repair work.

New construction has been confined to Atlantic coast yards. No new construction of sea going vessels is under way on the Pacific coast.

The Newport News Shipbuilding and Dry Dock Co. has the largest program under way. It is building eight passenger vessels, contracts for two being received early this year. For the Dollar Steamship Co. it is completing work on two 21,000-ton ships; and in addition is building three of 7000 tons each for United Fruit Co.; one of 5000 tons for the Peninsular and Occidental Steamship Co., (see page 21) and two of 5800 tons each for the Eastern Steamship Co.

The Bethlehem Shipbuilding Corporation, Ltd., a subsidiary of the Bethlehem Steel Corp., has under construction three vessels of 18,500 tons each for the Matson Navigation Co. and three of 7000 tons each for the United Fruit Co.

The Federal Shipbuilding and Dry Dock Co., a subsidiary of the United States Steel Corp., has been awarded contracts this year for two ships of 10,500 tons each for the Panama Mail line and two of 15,500 tons each for the Grace Steamship Co.

New York Shipbuilding Co., a subsidiary if the American Brown Boveri Electric Corp., is building two passenger vessels of 30,000 tons each, the largest to be constructed in this country, for the United States Lines, Inc., and two of 9400 tons each for the Export Steamship Corp.

The Sun Shipbuilding and Dry Dock Co., a subsidiary of the Sun Oil Corp., is constructing five tankers of 9000 tons each for the Motor Tankship Corp. and one of 9000 tons each for the Standard Transportation Co.

Cunard Superliner Speed

The new vessels in the building program of the Cunard line probably will have a maximum speed of 32 knots and will make the Atlantic crossing in four days flat.

While the Cunard line will probably attempt to regain the Atlantic speed honors which the MAURETANIA lost to the BREMEN and EUROPA, shipping experts are of the opinion that the British ships will have to show a speed of at least 32 knots in order to win back the laurels. They base their opinion on the belief that the two German liners have never been pushed to their utmost, but have merely been operated at a speed just fast enough to hold the speed records. Experts think that when the new super-tonnage enters service the BREMEN and EUROPA will be able to do 32 knots whenever called upon to meet the challenge of their rivals.

Large Ice-Breaking Vessel

The largest ship of her type ever built in a Canadian shipyard was launched on May 20 at the Davie shipbuilding yards of the Canada Steamships lines at Lauzon, Quebec. She was christened the CHARLOTTETOWN, and is designed as a combination ice-breaker, car ferry, and passenger ship, and will enter the service of the Canadian National railways between New Brunswick and Prince Edward Island.

The ship is 324 feet long, of heavy steel construction, with a molded beam of 59 feet and a depth of 25 feet, and has a gross tonnage of 4800. It has three heavy steel propellers, one forward and two aft, for cutting ice. Accommodation is provided for 16 latest type railway cars, between 40 and 50 automobiles, and about 750 passengers, officers and crew. The cost involved is approximately $2,225,000. The engines, which were built and installed by the Canadian Vickers company, Montreal, are specially designed to increase power and decrease fuel consumption. The ship will have an estimated speed of between 14 and 15 knots.

The Buda Co., Harvey, Ill., manufacturers of Buda M.A.N. diesel engines for marine service, generating sets and power units for various portable and stationary requirements, is celebrating its fiftieth anniversary.

American Ships Engaged In 1930 Foreign Trade

Vessels engaged in American foreign commerce made nearly 60,000 entrances and clearances through United States ports during the fiscal year 1930, according to a study recently completed by the bureau of research, United States shipping board. Ships engaged in this trade transported 104,670,487 tons of commodities making 29,909 entrances at American ports bringing in 49,764,658 tons of imports, and 29,975 clearances carrying out 54,905,829 tons of exports.

American flag vessels made a total of 24,796 or 41.4 per cent of the total number of entrances and clearances, and carried 42,091,023 tons or 40.2 per cent of the total amount of freight transported. The remainder of the entrances and clearances, numbering 35,088 were made by vessels of 30 different foreign nations which carried 62,579,464 tons of freight.

Incoming American vessels made 41.6 per cent of the total number of entrances and brought in 50.7 per cent of the total imports received, while outgoing American vessels made 41.2 per cent of the clearances and carried 30.7 per cent of the tonnage exported.

The office of the N.Y.K. line was removed on May 1 to 25 Broadway, New York.

Rates Reaffirmed

Coal and iron ore vessel carrying rates and boat fuel prices on the Great Lakes for the season of 1931 have been announced as unchanged from last year.

The 1931 ore-carrying rates therefore are: 70 cents a gross ton net to vessels from the head of Lake Superior; 63 cents a gross ton from Marquette; 52½ cents from Escanaba to Lake Erie ports, and 42 cents from Escanaba to Lake Michigan ports.

The coal-carrying rates for the new season are: Net rate to boats of 35 cents a net ton to fast docks on Lake Superior; 45 cents a net ton to fast docks at Milwaukee and southern Lake Michigan ports, and 40 cents a net ton to ports on Lake Michigan north of Milwaukee.

The Pittsburgh Coal Co., one of the principal fueling companies on the Great Lakes, announces for the season a price of $5.25 a net ton for vessel fuel and from fuel lighters at Cleveland and Ashtabula, and the same price for vessel fuel at the company's docks at Sandwich, Ont., the Lime Island, Mich and car dumper fuel at Lake Erie ports will be $4.75 per net ton.

Will Direct Work of New Export Case Association

ANNOUNCEMENT was made recently of the formation of the Export Fibreboard Case association with headquarters at 155 Montgomery street, San Francisco. Sponsors of the new organization include prominent American fibreboard case manufacturers and the purpose of the association is to foster the use and acceptance of fibreboard shipping cases in export trade. Plans call for development on a national and international scale.

H. L. Stilwell, packaging engineer, is head of the new association and as managing director will devote his entire time to promoting the work of the organization. Climaxing a sales career of over 20 years, Mr. Stilwell's appointment to his present post is in recognition of ability. He has served as salesman, advertising executive, merchandising and sales executive and packaging engineer. His influence in developing the use of fibreboard cases in export trade has been particularly effective

H. L. Stilwell

One of the chief duties of the association will be to set a standard of merit for all export fibreboard cases manufactured by members. A trade mark has been designed and its use will be licensed to any member for export cases which meet the association's standards. Through experience gained in shipping raisins and canned goods over a period of nearly two years, specifications have already been determined for fibreboard cases.

At the annual meeting of Cutler-Hammer, Inc., manufacturers of electric control apparatus, Milwaukee, Wis. on April 14, Frank R. Bacon, former chairman of the board, was elected president to fill the vacancy caused by the death of Beverly L. Worden. The office of chairman of the board was abolished. Other officers and directors were elected as follows: Vice presidents: F. L. Pierce, J. C. Wilson, treasurer, H. F. Vogt, secretary, W. C. Stevens. Directors elected were F. R. Bacon, F. L. Pierce, J. C. Wilson, H. F. Vogt, W. C. Stevens, T. Johnson Ward, of Cassatt & Co., Philadelphia; Carl A. Johnson, president of the Gisholt Machine Co., Madison, Wis.; L. A. Lecher, of Bottum, Hudnall, Lecher, McNamara & Michael, Milwaukee; G. S. Crane, general sales manager of Cutler-Hammer, Inc.; E. A. Bacon, vice president of the First Wisconsin National Bank.

Vice-President of I.M.M. Dies in New York

John H. Thomas, 62, vice-president of the International Mercantile Marine Company, died at his home in New York on May 17. He had tendered his resignation and planned to retire to his estate in Maryland at the end of this year.

He was born in Mattapany, Md., and his entire business life was identified with shipping. He began in Baltimore with Furness, Withy & Co. and went to New York with them in 1896. In 1898 he became associated with the Atlantic Transport Co. as assistant to P. A. S. Franklin, at that time manager of the New York office.

Later he became New York manager for the line and when the Atlantic Transport line was absorbed by the I. M. M. Mr. Thomas became freight, and later operating manager of that company. In 1910 he went to Boston as manager of the company's offices there, but returned to New York in 1917 on his election as vice president. He had been a director since 1921.

During the war he acted as director of the port of New York, supervising the loading and dispatch of supply ships.

His wife Mrs. Margaret Hale Thomas, and a daughter, Miss Anne Thomas, survive.

Leader in Package Freight Trade Dies in Buffalo

JAMES CAREY EVANS, 69, president of the Great Lakes Transit Corp., Buffalo, and well known in Great Lakes marine circles, died at his home in Buffalo on April 28 after an illness of three weeks.

Born in Oswego, N. Y., Dec. 12, 1862, Mr. Evans came from a family long identified with shippng interests. His great-grandfather, William Evans, who settled in Buffalo nearly a century ago built the Evans ship canal and his grandfather built the Evans grain elevator at Buffalo. At the age of 26 he became vice-president of the Canal & Lake Steamboat Co. and in 1901 was appointed western freight agent for the company with offices in Chicago. In 1911 he was elected vice-president and general manager of the Anchor line and in the same year was also elected president of the Western Warehousing Co. When the late William J. Connors formed the Great Lakes Transit Corp. in 1915, Mr. Evans was made president and a director and continued in that capacity until his death. The Great Lakes Transit Corp. operates one of the largest fleets of passenger and package freight vessels on the Great Lakes and it was under Mr. Evans' direction that the fleet developed and increased the transportation of dairy and other perishable products by lake from the Northwest. Many of the ships in this fleet are equipped with refrigeration.

J. C. Evans

He was a director and member of the executive committee of the Lake Carriers' association and the Great Lakes Towing Co., Cleveland. He is survived by Mrs. Evans, a son, James Carey Evans 3rd, and a daughter, Mrs. Reginald B. Taylor.

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
May 18, 1931	4.85@5.25	1.00	4.08
April 18	4.85@5.25	1.10	4.32
Mar. 18	4.85@5.25	1.10	4.55½
Feb. 18	4.85@5.25	1.10	4.55½
Jan. 18	4.85@5.25	1.10	4.55½
Dec. 18	4.85@5.25	1.10	4.55½
Nov. 18	4.85@5.25	1.10	4.92
Oct. 18	4.85@5.25	1.10	4.92
Sept. 18	4.85@5.25	1.10	4.92
Aug. 18	4.85@5.25	1.20	4.92
July 18, 1930	4.75@5.00	1.20	4.92

At Philadelphia

	Coal trim in bunk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
May 18, 1931	4.85@5.25	1.00	4.4
Apr 1 18	4.85@5.25	1.00	4.60
Mar. 18	4.85@5.25	1.00	4.88
Feb. 18	4.85@5.25	1.00	4.88
Jan. 18	4.85@5.25	.85	4.88
Dec. 18	4.85@5.25	.95	4.88
Nov. 18	4.85@5.25	1.00	4.88
Oct. 18	4.85@5.25	1.05	4.88
Sept. 18	4.85@5.25	1.05	4.88
Aug. 18	4.85@5.25	1.05	4.88
July 18, 1930	4.75@4.50	1.10	4.88

Other Ports

Boston, coal, per ton	$6.87
Boston, oil, f. a. s., per barrel	1.06
Hampton Roads, coal, per ton, f.o.b., piers	$4.35 to 4.50
Jan. 8—Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 6d
Antwerp, Fuel oil, per ton	67s 6d
Antwerp, Diesel oil, per ton	82s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

DAMAGES to a vessel resulting from collision should be assessed on the basis of compensation, said the court in the case of F. J. LUCKENBACH, 42 F. (2d) 279, or, as otherwise expressed, that the injured party should be restored in a financial sense to the position in which he would have been had the injury not been suffered. It was also said that there is another principle of law common to the law maritime and common law. This is that the injured party may not exaggerate or inflame his damages, but, on the contrary, must do everything which may be reasonably expected of him to minimize his damages. Damages are assessed broadly and in the aggregate at the sum sufficient to restore to the injured party what he has lost. In reaching this sum of damages there are, of course, elements to be considered, but it is a wrong view to look upon and award damages for these elements as items in the sense of an item in a book account of goods sold and delivered. When a vessel is damaged through a collision or otherwise, either of two courses may be followed. If the damage is so extensive that, as the expression goes, the vessel is not worth repairing, she may be abandoned as a total loss, and the damage is then the fair value of the vessel immediately before the collision in which she was damaged. If, however, she may be repaired and thus restored to the condition in which she was, then the damage becomes the cost of repairs, less, in some instances, the difference betwen her repair value and her former value.

* * *

IN DETERMINING whether a repairman is entitled to a maritime lien for making repairs to a vessel, it is the intent expressed in the instrument which controls.—PRESIDENT ARTHUR, 42 F. (2d) 288.

* * *

THE basic principle governing salvage awards is that such an award should be made as will encourage others in similar circumstances to save property exposed to the perils peculiarly incident to the sea. But at the same time the award should be fair to the owners and not be made so large as to impose an undue hardship upon them. While the amount of a salvage award is largely a matter of judicial discretion, as was said in the case of SCHREVEPORT, 42 F. (2d) 524, still there are certain general principles which are well recognized. They have been stated by the Supreme Court of the United States as follows: "Courts of admiralty usually consider the following circumstances as the main ingredients in determining the amount of the reward to be decreed for a salvage service: (1.) The labor expended by the salvors in rendering the salvage service. (2.) The promptitude, skill, and energy displayed in rendering the service and saving the property. (3.) The value of the property employed by the salvors in rendering the service, and the danger to which such property was exposed. (4.) The risk incurred by the salvors in securing the property from the impending peril. (5.) The value of the property saved. (6) The degree of danger from which the property was rescued." It is also proper to consider the degree of success achieved and the proportion of value lost and saved.

* * *

THE necessity of a tug captain keeping his tow in line is constantly repeated in the cases. This is a wise and necessary precaution especially in a busy thoroughfare like the east river. It means that a tow is held to a degree of care commensurate with the risk, or, as some authorities seem to hold, to a high degree of care, or extreme care to avoid danger of collision. While the decisions will usually be found to apply to long hawsers, with tows having naturally a wide swing if carelessly handled, and the absence of a helper tug where due care required the presence of such vessels, yet the length of a hawser has not been the test.—BOFISCO, 42 F. (2d) 549.

* * *

WHERE the owner in good faith appoints a competent agent to equip, man, or maintain a vessel or her machinery, any acts of ommission or commission of the agent, not participated in personally by the owner, do not constitute "privity or knowledge" within the meaning of the limitation of liability statute.—PONTIN BROTHERS, 42 F. (2d) 556.

* * *

THE law is well settled, it was declared in the case of Ford v. Kline, 42 F. (2d) 556, that the coast guard may, upon probable cause, stop any vessel upon the high seas without reference to coast line distance, when sailing under the American flag, and search and seize the same upon discovery of its being loaded with contraband liquor.

* * *

THE courts look with favor upon salvage. It is in the nature of a reward for meritorious services rendered in laborious and perilous enterprises. Where a vessel is in distress, in peril and danger, or where the sea is rough, and the weather unfavorable and the wind high, or where other facts which usually attend a vessel in distress exist, there is always a risk and danger in rendering assistance. It is easier for another vessel to stay out of the way or to pass by and not attempt to render assistance than it is to undertake the risk of doing so and incur a risk of injury to itself and a possible loss of life and cargo in connection with the effort. It has therefore been the policy of the courts, in order to encourage salvaging and the saving of life and property at sea, to be liberal in the matter of salvage where the vessel has made an honest effort to be of assistance or has joined with others in doing so, whether its efforts resulted in the final saving of the vessel or not, provided the failure of final success was not due to any lack of honest effort and willing purpose to assist.—Atlantic Transport Co. v. United States, 42 F. (2d) 583.

* * *

THE blowing of a signal is not an excuse for not being careful after giving it.—COMET No. 5, 42 F. (2d) 654.

* * *

IT IS the duty of the tug to observe and properly protect boats in the tail end of her tow as well as boats in the forward end and to urge proper caution to see that those in the tail end are not injured or endanger others. Naturally, the longer the tow and the more unwieldly, the greater is the care required.—MARION J. 42 F. (2d) 657.

* * *

WHEN a person who furnishes services or supplies to a vessel knows that the vessel is under charter and does not proceed to ascertain the terms of the charter or the authority of the person with whom he contracts to represent the vessel, the furnisher of the services has no redress against the vessel, unless the charter grants to the charterer authority to impose a lien, but must look to the person who ordered them.—BEN LAWERS, 42 F. (2d) 897.

* * *

THE authorities are ample, according the case of Trent v. Gulf Pacific lines, 42 F. (2d) 903, to the effect that by the articles the ship is bound to the men, just as the men are bound to the ship, and that it is not for any little infraction of discipline that a discharge may be effected. In the instant case it was held that where the ship's cook was wrongfully discharged, but his wages were tendered at the time and refused, he could not recover double wages, but he could recover only wages earned and one month's additional wages as compensation for his wrongful discharge.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	496	2,538,201	527	2,656,992
March	494	2,396,654	489	2,323,422
February	439	2,127,771	484	2,261,468
January	486	2,417,338	542	2,533,711
December	539	2,497,454	521	2,454,917
November	485	2,194,780	470	2,144,883
October	530	2,546,629	548	2,636,414
September	591	2,877,309	556	2,693,493
August	554	2,716,668	586	2,855,323
July, 1930	578	2,717,787	616	2,815,336

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	68	189,113	51	136,433
March	65	198,848	46	116,786
February	69	200,212	53	163,134
January	70	227,146	49	158,570
December	80	206,778	55	144,471
November	87	226,006	46	122,107
October	85	231,460	53	144,530
September	87	232,781	52	147,365
August	92	244,206	55	144,201
July, 1930	96	246,866	68	151,861

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	107	292,403	89	233,756
March	97	279,797	66	243,377
February	76	259,402	57	190,598
January	76	245,382	49	195,091
December	91	287,347	50	174,971
November	77	248,220	61	232,826
October	96	321,092	65	208,695
August	115	305,649	101	299,454
July, 1930	152	325,325	110	222,555

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	11	30,000	10	25,765
March	6	20,081	7	20,122
February	18	48,722	15	45,664
January	14	40,247	15	46,602
December	23	55,605	23	60,126
November	21	46,182	20	40,916
October	17	41,667	20	45,989
September	32	53,423	28	49,428
August	36	69,765	36	72,282
July, 1930	42	83,987	42	84,939

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	8	32,848	6	25,101
March	5	18,288	4	17,400
February	9	43,707	8	30,036
January	8	28,019	5	15,335
December	9	36,380	6	25,318
November	13	46,927	5	18,597
October	10	37,269	5	22,305
September	6	28,972	3	16,265
August	7	29,532	4	16,388
July, 1930	10	36,403	5	19,623

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	26	104,099	36	141,036
March	41	158,869	46	173,220
February	24	95,726	43	175,697
January	29	119,686	47	192,455
December	27	107,300	52	197,628
November	30	122,020	53	208,266
October	40	155,991	54	207,118
September	30	122,022	46	182,641
August	32	125,137	46	174,985
July, 1930	30	118,919	53	193,425

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	131	409,907	139	420,594
March	123	385,514	107	336,157
February	99	327,516	106	340,771
January	121	386,924	127	412,306
December	120	390,126	127	429,048
November	116	384,877	117	376,725
October	139	452,905	127	402,155
September	150	475,928	138	424,976
August	130	412,209	125	396,421
July, 1930	132	444,823	144	455,226

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	.....	.....	.....	.....
March	19	47,982	52	137,616
February	15	43,123	46	116,116
January	21	57,883	61	170,594
December	44	92,341	63	174,384
November	22	65,716	56	141,242
October	21	72,517	58	153,410
September	21	48,971	66	168,922
August	28	66,765	50	139,710
July, 1930	27	63,721	60	144,446

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	15	31,901	5	10,614
March	10	17,299	6	7 839
February	7	18,934	9	20,915
January	14	28,243	10	15,617
December	17	33,862	16	29,847
November	14	30,105	10	13,048
October	14	27,810	14	27,016
September	12	26,442	13	26,356
August	15	29,565	12	20,856
July, 1930	6	14,312	8	20,739

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	60	55,493	51	54,656
March	60	69,731	56	72,956
February	61	70,169	56	69,443
January	61	82,218	57	30,394
December	56	71,327	56	75,588
November	49	63,307	50	64,389
October	50	61,288	49	60,432
September	48	64,968	48	64,742
August	50	61,440	50	61,666
July, 1930	56	68,968	55	69,397

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	107	251,402	108	242,685
March	109	232,778	102	229 966
February	93	222,163	86	206,376
January	112	282,874	111	249,375
December	91	208,802	84	194,477
November	106	241,663	99	220,755
October	99	187,035	92	196,893
September	83	184,276	81	171,679
August	102	190,362	96	176,488
July, 1930	113	211,989	95	173,549

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	50	214,534	48	210,117
March	47	207,105	49	212,237
February	48	212,187	53	233,121
January	54	238,037	60	266,744
December	56	240,203	61	256,724
November	59	255,728	57	245,592
October	57	246,957	63	272,114
September	62	268,203	58	250,301
August	48	200,602	48	209,109
July, 1930	54	248,954	60	261,746

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	195	576,251	181	536,678
March	185	545,474	188	537,148
February	159	499,643	172	537,813
January	207	610,472	190	548,267
December	203	602,527	197	578,723
November	187	555,053	194	541,671
October	218	633,652	228	672,782
September	210	589,459	218	605,239
August	220	600,786	241	666,625
July, 1930	270	697,526	245	653,562

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
April, 1931	17	45,890	19	50,033
March	15	36,938	12	27,110
February	14	33,837	16	37,092
January	20	47,834	21	49,516
December	22	62,668	23	66,852
November	23	63,701	24	65,492
October	19	47,530	27	74,815
September	19	54,863	19	69,530
August	13	34,274	13	24,742
July, 1930	25	70,538	25	51,805

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	26	62,924	68	210,315
March	25	39,536	69	205,341
February	23	40,825	71	209,057
January	25	45,442	84	260,555
December	40	97,907	91	282,726
November	27	58,099	101	303,748
October	25	47,967	111	339,152
September	46	117,185	119	337,091
August	37	82,429	97	277,077
July, 1930	40	93,999	83	249,064

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	225	644,178	209	626,590
March	224	602,763	210	623,023
February	181	557,981	196	561,570
January	191	673,620	193	753,720
December	227	654,598	184	596,347
November	219	618,855	206	616,266
October	236	680,430	217	628,733
September	255	697,262	218	616,018
August	211	631,167	221	621,088
July, 1930	230	687,670	196	611,768

San Francisco

(Exclusive of Domestic)

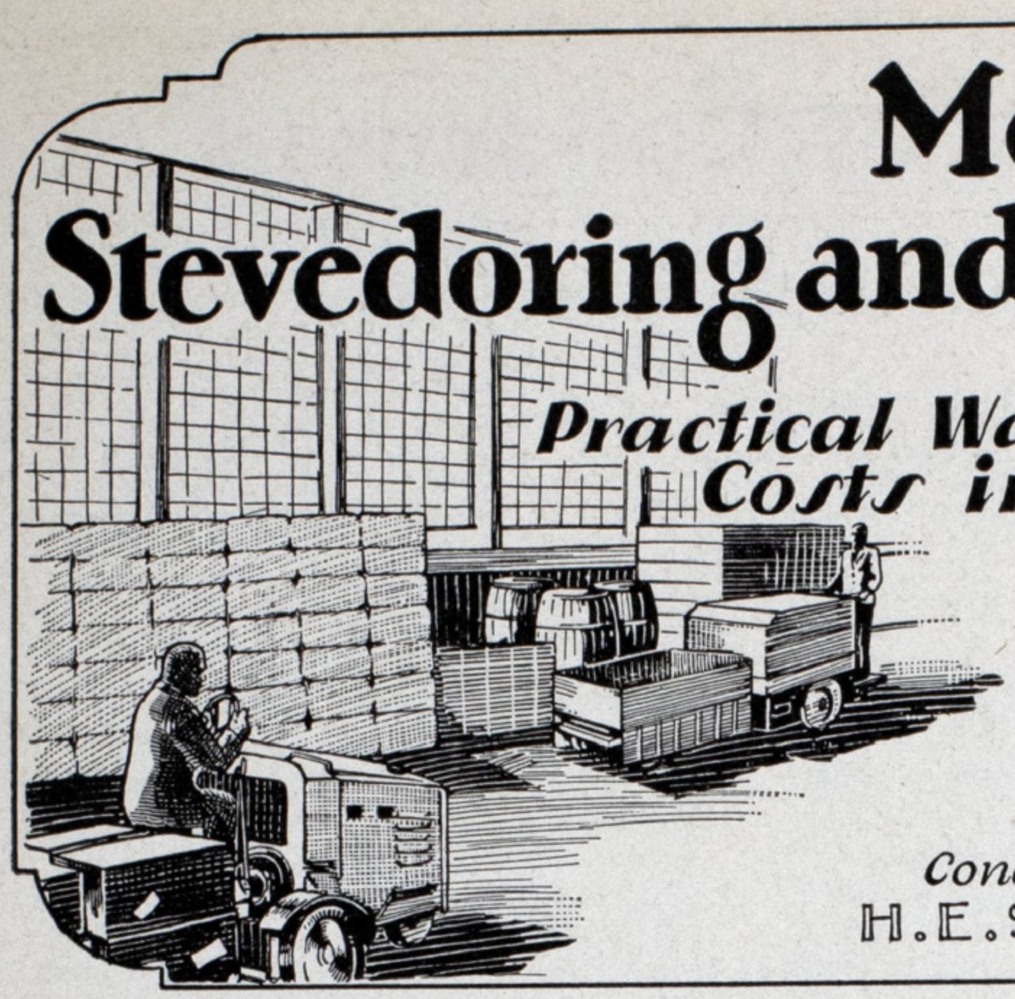
Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	568	1,473,401	588	1,547,440
March	622	1,558,225	609	1,432,869
February	532	1,405,034	563	1,386,464
January	165	685,851	172	721,042
December	154	646,767	174	689,358
November	144	570,715	161	656,424
October	151	617,143	154	639,552
September	171	699,832	154	629,577
August	164	670,748	159	653,208
July, 1930	166	674,380	166	676,092

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
April, 1931	32	125,007	47	177,058
March	24	106,838	32	131,470
February	30	130,544	38	152,347
January	26	111,047	37	140,860
December	35	143,585	47	185,757
November	28	105,541	50	178,538
October	34	136,215	50	182,729
September	32	140,415	62	220,024
August	39	147,462	69	257,365
July, 1930	30	120,727	42	158,570

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 61 of 208,110 net tons entered and 70 of 236,081 net tons cleared for the month of April.



Modern Stevedoring and Dock Management

Practical Ways to Cut Costs in Cargo Handling

Conducted by
H. E. STOCKER

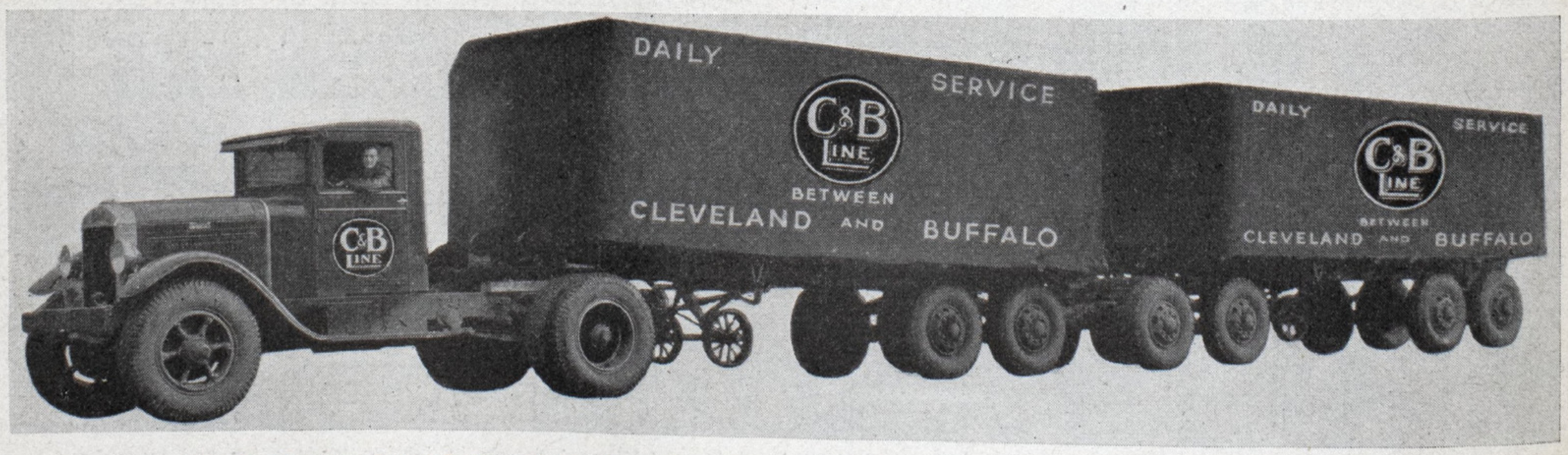
Improved Cargo Handling Methods Are Effective in Meeting Competition

INDUSTRIAL type tractors and trailers installed at the terminals of the Cleveland and Buffalo Transit Co. are credited with a saving of 48 per cent—$24,000—of their total cost during the first year's operation. One of the unexpected, but welcome, results was an average daily tonnage during the 1930 season fully 30 per cent higher than estimated. This resulted in an actual increase in employment in both terminals. The convenience of trailer-lot shipment with storedoor and pickup service optional, wins favor with shippers. Rapid freight handling eliminates delays in sailing schedules. An auxiliary motor truck division permits all-year service.

For a long time the true meaning of transportation has been obscured by the over-emphasis placed on the efficiency of the common carrier. The popularity of this conception had its origin in the development of the steamship which made it possible to transport tremendous tonnages over long distances at an amazingly low cost. The rapid rise of the motor truck in recent years to become an important factor in the freight transport field has proven that mere magnitude is not always a guarantee of supremacy. Why the steamship should lose its powerful advantage in competition with other freight carriers has been a source of perplexity for ship operators. Now, it is being understood that a large portion of the difficulties have arisen, not from any defect in the actual freight carriers, but from the increasing cost of activities connected with the operation of the terminal services.

This new factor has to do with the work required for loading, unloading and handling in the freight terminals. From facts that are self-apparent it is the cost of this work that has cut into the margin of profits. In examining the situation four unfavorable conditions are frequently discovered: First, hand labor being used for work that can be performed more economically with modern mechanical equipment; second, motor trucks have catered to the increasing demand for convenience and speed; third, due to time required for loading and unloading, boats are kept out of actual service for longer periods than are required for other carriers; and fourth, the time required for loading frequently disrupts the sailing schedule and thereby destroys confidence in the service.

From this summary of the conditions, obviously, it would be desirable to take advantage of any economies offered by modern mechanical equipment not only in the reduction of handling costs, but for improving the service and increasing the useful-



The Cleveland and Buffalo Transit Co. Operating a Motor Truck Division Between Cleveland and Buffalo to serve its Patrons in Port to Port business. During the Closed Season of navigation at same basis of freight rates

ness of the carriers. In some instances, such as on the Great Lakes, it may even be advantageous to actually enter the motor truck field and, by a combination system, offer all-year service.

One of the operators that has dealt aggressively with the situation along these lines is the Cleveland & Buffalo Transit Co. which has been serving the shipping and travelling public on the Great Lakes for the past 36 years. Large terminals are maintained and operated at Cleveland, and Buffalo. Four large combination freight and passenger boats of the side wheel Great Lakes type are operated daily during the navigation season between Cleveland and Buffalo, Cleveland and Port Stanley on the Canadian shore and between Cleveland, Cedar Point and Put-in-Bay on the Ohio shore.

The problem of handling freight tonnage arises chiefly on the Cleveland-Buffalo run as practically no freight is handled on the other routes operated. Each boat has a single freight deck extending forward and aft from the engine room to approximately midship and directly under the first main cabin deck. Entrances to the freight deck are through side ports of sufficient height and width to accommodate the ordinary stock size passenger automobile and motor truck. The terminal warehouses at Cleveland and Buffalo handle carload and less than carload freight delivered to and received from local city shippers, railroad connections by car and barge lines at Buffalo.

Business Affected by Competition

The advent of the motor truck and the passenger automobile into the transportation field had made inroads upon the company's traffic business. To offset the reduction in the less than carload lot freight with its higher classification rates, the management has been steadily soliciting and handling increasing volume of carload freight. In addition to the changed traffic conditions another important factor was the advance in wages paid to labor which directly affected the cost of handling all freight.

After careful consideration, the management decided to investigate the advantages offered by the latest type of freight handling equipment. It was hoped that a thorough examination might show a possibility of reduction in the cost of handling which would partly offset the changed traffic conditions and the advance in wages.

At the close of the 1929 season the Mercury Manufacturing Co., Chicago was consulted and a complete examination was made of all the tonnage handled, the physical conditions pertaining to vessels and terminals, the type of labor employed and wages paid, the service rendered to the shipper and the cost of handling for a complete season.

In December, 1929, a report was submitted giving complete details as follows:

1. Proposed equipment investment.
2. Estimated equipment operating cost.
3. Present and proposed methods of operation at both Cleveland and Buffalo.
4. General summary of average daily operations for both Cleveland and Buffalo.
5. Recapitulation, showing gross savings—depreciation—interest—net

At the Buffalo Terminal of the Cleveland and Buffalo Transit Co. Hauling Sugar on Board with Tractor. Twenty-five 100-pound sacks per trailer

Cleveland & Buffalo Transit Co.

Cost and Production Chart for Cargo Handling

Terminal—Cleveland — Month—November, 1930

Date	Men	Tons Unloaded	Tons Loaded	Total Tons	Total Hours	Total Money	Tons per Man Hour	Cost per ton
1	62	363	110	473	410¼	192.22	1.15	.407
2	48	317	23	340	260¾	121.73	1.30	.358
3	57	350	165	515	461½	216.00	1.11	.419
4	52	336	82	418	365¼	172.15	1.11	.411
5	57	410	92	502	409¾	192.53	1.22	.383

Daily Average Cargo Handling Results

Cleveland	Old Method	Proposed Method	Actual Results 1930
Total tons	376.0	376.0	488.6
No. of men	51.9	42.2	54.1
Total man hours	525.65	376.07	522.46
Labor expense	$244.42	$187.05	$243.12
Tons per man hour	.711	.999	.935
Cost per ton	$ .6542	$ .5081	$ .4975
Buffalo			
Total tons	372.6	372.6	488.9
No. of men	62.9	48.0	63.0
Total man hours	528.44	404.95	509.90
Labor expense	$301.86	$232.19	$287.84
Tons per man hour	.705	.920	.958
Cost per ton	$ .8143	$ .6339	$ .5886

Miscellaneous Freight on Trailers Taken on board ship by Tractor at the Buffalo Terminal of the C & B Transit Co.

Kegs of Nails on Trailers being moved by Tractors from shed to ship at the Buffalo Terminal of the C & B Transit Co.

saving.

6. Details and recommendations.

7. Equipment specifications and illustrations.

The salient facts presented in the report were:

First—An estimated saving of $23,017.24 could be obtained.

Second—A decided increase in service could be rendered to the shipping public.

Third—The equipment necessary to effect the saving and the increase in service would cost $50,000.

The unfavorable business conditions existing at the opening of the 1930 lake season naturally made the management dubious about a proposition requiring the immediate expenditure of this amount of money. Could $23,017.24 be saved in one operating season? The management was frankly skeptical.

The manufacturer met these natural objections by submitting for consideration a contract for the purchase of the equipment which would not require any immediate capital expenditure. Briefly, this contract stipulated that the Cleveland & Buffalo Transit Co. could acquire title and ownership to the equipment by payment each month of the actual savings effected in the reduction of handling costs. The manufacturer also agreed to furnish a competent representative to train the men and direct the supervision in the use of equipment and the new methods involved.

This opportunity to acquire $50,000 worth of modern freight handling equipment, with the services of an experienced engineer to act as a mentor and guide, changed the entire proposition into one where there was much to be gained with nothing to be lost. The initial investment and the results to be obtained rested entirely with the manufacturer; therefore the contract was signed.

Six industrial type gasoline tractors, 600 steel castor type freight house trailers, equipped with modern safety couplers and racks, and 20 special type dollies for handling machinery were distributed equally between the Cleveland and Buffalo terminals for the start of the season of navigation on April 29, 1930.

A cost and production chart as illustrated in table on page 47 was installed for the education and guidance of the foreman.

This chart carries a full month's record of the individual daily operations on one single sheet. The foremen were taught to analyze each day's results as shown by the charted figures in order to accomplish maximum results. Satisfactory results were obtained even for the first month's operation as evidenced by a reduction of $.166 per ton at Cleveland and $.192 per ton at Buffalo. The following tabulation shows the average daily results obtained for the first season compared with estimated performance outlined.

It is interesting to note that in both terminals the actual cost was lower than the estimate. Due to higher wages, the cost at Buffalo is higher than at Cleveland, although Buffalo really excells in efficiency (tons per man hour). Increase in tonnage over the estimate is credited to the better service offered. The total savings for the 1930 season was $24,007.73, which was $990.49 more than estimated in the original report.

Reasons for the increased patronage of shippers received by the Cleveland & Buffalo line are apparent in a few examples of the service rendered:

1. Delivery and receipt of local freight from and to trailers at the tailgate of vehicles resulted in a considerable reduction of time for the customer's truck or dray.

2. Empty trailers were furnished to industries in Buffalo for direct loading at the plant without any further handling until the freight was unloaded from the same trailers at the consignee's plant in Cleveland.

3. On one occasion 1300 cases of hothouse tomatoes were received one evening fifteen minutes before scheduled sailing time. The entire shipment was unloaded from the tailgate of the trucks onto trailers. The loaded trailers were run onto the freight deck with no rehandling and the boat sailed only five minutes behind the regular schedule.

4. In general, all freight loaded and transported on trailers has speeded up both the receipt and the delivery and also reduced the element of damage to the freight, and claims.

In addition to the installation of modern freight handling equipment for the purpose of economically and safely handling freight, the Cleveland & Buffalo Transit Co. has installed a motor truck division operating between Cleveland and Buffalo. This operation was started at the close of navigation in November, 1930, for the express purpose of serving their patrons on port to port business during the season of closed navigation on the same divisional basis of freight rates which prevailed during the navigation season.

This new service included the same optional storedoor and pickup service which had previously prevailed during the navigation season. To handle this winter traffic, a fleet of six modern motor vehicle transportation units was put into service. Each train has a payload capacity of 24 tons of freight The success of this new service has been established and proven by the fact that capacity loads have been carried in both directions since the inauguration of this service.

Machine Screws and Bolts Stowed on Trailers on board the City of Frie of the C & B Transit Co. Average Trailer load 3000 pounds

Using Fibreboard Packing Cases in Export Shipments

By Capt. Kristen Tvede

PACKING of shipments for transportation has always been a problem and always will be, but it has never been more pressing than it is today when every economy counts.

Ten years ago 20 per cent of the domestic shipments were packed in fibre containers, while today it is claimed that 80 per cent of domestic shipments are packed in fibre cases.

Export shipments are packed almost entirely in wooden crates or cases. A commodity for export is seldom packed in a fibreboard case, although the same commodity packed for a 2500-mile railroad haul, or a 2000-mile coastwise journey, or a 6000-mile intercoastal voyage, is almost certain to be in a fibreboard case.

No doubt lack of suitable regulations covering the manufacture of fibreboard cases has retarded the development of their use, but with the recent organization of an association to standardize design and quality a steady widening of application is looked for. Its use offers new economies necessary to the greater development of export markets, with consequent advantage to shipping lines.

One of the largest steamship companies in the intercoastal trade, has reduced its freight claims to 89/100 of one per cent of the gross freight revenue. It is significant that at least 50 per cent of the general cargo carried by his company is packed in fibreboard cases.

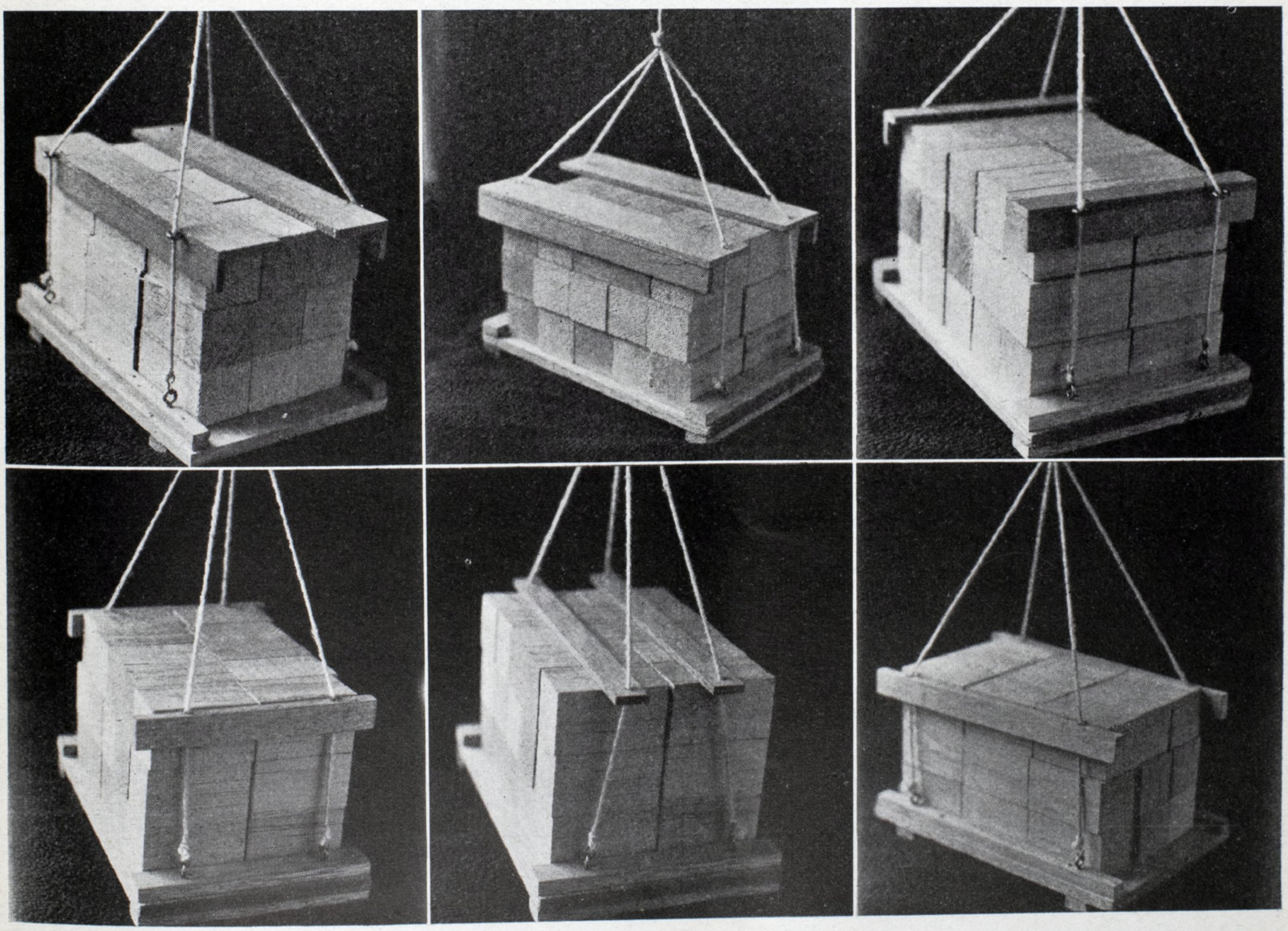
A properly made fibreboard case is not a frail container. Much scientific research is carried out before a first class fibreboard case is put on the market. The material used in making the fibreboard case is given a severe laboratory test and the finished case is put through a rigid trial before a responsible manufacturer will recommend the case to the shipper.

The handling and stowing of commodities packed in fibreboard cases is not difficult and requires little extra precaution. There are a few things to be considered when stowing cases, whether the cases are of fibreboard or of wood. A solid and even floor should bbe provided. Where dunnage is used it should be laid even and as close as practical. It is imperative that the dunnage used be of even thickness and that the boards do not overlap. Cases should not touch stanchions, ventilators, nor the clips holding the cargo battens in place.

The writer has seen canned goods from the Far East, packed in fibreboard cases, discharged in New York in perfect condition, although the shipment was stowed twelve feet high. The floor on which this shipment was stowed was an even solid floor.

Without exception platform slings should be used in handling fibreboard cases. There are several types of platform sling, the chief difference from the standpoint of handling cases being in the type of spreader used. The

(*Continued on Page* 52)



Model of slingload for studying the effect with spreaders of different types and location in reference to the load. 1. Spreaders on side, ropes passing through side of platform. 2. Spreaders on side but with ropes passing through ends of platform. 3. End spreader of better design than the single piece type. 4. Simple type of spreader at ends of load. 5. Simple type of spreader on top of load. 6. Simple type of spreader on side of load

Handling Costs--Rails to Ship--Reduced on Seattle Dock

By Robert C. Hill

AT MANY of the more important freight terminals throughout the country the use of electric trucks and skids is not uncommon but their adaptation to the movement of freight from rail to ship or vice versa necessitated a number of adjustments to provide a smoothly co-ordinated service in this new field.

Experiments along these lines have been successful at the Ocean dock of the Chicago, Milwaukee, St. Paul & Pacific railroad, Seattle. The usual type of electric trucks is in service in conjunction with a new style of skid. A careful survey was made by railroad officials in conjunction with the Elwell-Parker Electric Co.'s engineers and the Colby Steel & Engineering Co. This study dealt with the railroad's material handling operations, and resulted in the selection of the following equipment:

Five Elwell-Parker electric industrial trucks equipped with Exide batteries were installed. The types selected included two three-ton low lifts; one three-ton high lift and two fork trucks of 3500 pounds capacity each. For handling large cases, hogsheads of fish, bales of gunnies and all kind of bulky materials the fork trucks have been highly successful. When occasion demands, they have been used to good advantage as tractors, towing trailers. By this method, as an example, hardwood lumber is handled at a reduction of $1.00 per ton, representing a saving of 90 per cent of the former cost.

The lift trucks handle all freight and cargo possible, both incoming and outgoing, on skids. Railroad tracks in the inboard side of the pier are provided with a platform at the level of car doors, which enables lift trucks to be worked inside cars. Freight is loaded on skids which are placed either on the dock or transferred directly to the ship. Cargo delivered by motor truck is also placed on skids when it arrives and moved in the same manner.

Using the Lift Truck

While the lift trucks performed efficiently, as usual, it was apparent that in the transfer of freight from rail to water or vice versa the selection of skids would govern their effectiveness. It was obvious that a skid which could be handled by ship's tackle in the same manner as a board sling would eliminate handling at ship's side, both incoming and outgoing cargo. Such a method would make it possible to transfer freight from car to ship's hold in skid units of from 2000 to 6000 pounds each.

Experience in cargo traffic suggested the selection of a skid which could be handled by ship's tackle in the same manner as a board sling. This resulted in the adoption of a combination skid and sling board equipped with four steel reversible legs in order to harmonize with the requirements aboard ship, and at the same time reduce the amount of space necessary to store the skids in the shed when not in use. After considerable experimentation 200 patented Colby-Harbord combination skids and sling boards were furnished by the Colby Steel & Engineering Co. When the legs are in the down position, the device is used as a skid and the customary clearance is provided beneath the deck to permit the lift truck platform to run under it. When picked up by the lift truck the legs are relieved of their loads and are free to be reversed to a position to receive the ship's sling hooks.

The skids selected have a deck 6 feet long by 4 feet 6 inches wide. The four steel reversible legs are hinged by bolts through the steel U straps and 4 x 6 inches continuous stringers to which the deck planks are bolted. The stringers run the entire length of the skid, providing ample bearing area to allow it to be landed on sacks or other fragile cargo without inflicting damage. The legs are held in any desired position by a simple locking device. The continuous iron binder around the deck protects the ends of the planks against damage and provides a smooth running surface for spotting the skids in close quarters.

In the matter of conserving space this type of skid has an important advantage. When the legs are re-

(*Continued on Page* 52)

The author, Robert C. Hill, is northwest representative for MARINE REVIEW with office in Seattle.

Electric lift trucks and skids on ocean dock of Chicago, Milwau kee, St. Paul & Pacific railroad at Seattle. At left—Delivering two loaded skids at ship side. At r ight—Loaded skids stacked on dock

Useful Hints on Cargo Handling

SHIPPING lumber in unit packages continues to grow because of the economy resulting from less handling and less damage because of less handling.

The accompanying illustration shows a small unit package of lumber. Other packages of greater size are moved coastwise on the Pacific coast. Note protectors at corners. There is less damage to the lumber even if protectors are not used because at the most, only four pieces of lumber are damaged, whereas when the lumber is handled piece by piece many more are likely to be damaged.

One steamer recently discharged a deck load of lumber at a cost of 6 cents per 1000 feet board measure. Packages were stowed in the hold of another steamer with less loss of space than the same class of lumber stowed piece by piece.

A large ship was completed abroad recently with four ten-ton booms at each of the main cargo hatches.

The Kane cargo light has proved an excellent means of lighting ships' holds. Plates to hold sockets can be installed wherever needed and light and reflector quickly inserted. Adjustable ball sockets permit throwing the light in any direction. This type of light has been approved by the accident prevention department of the Pacific American Steamship association, Shipowners' association of the Pacific coast and the Waterfront Employes' union of San Francisco.

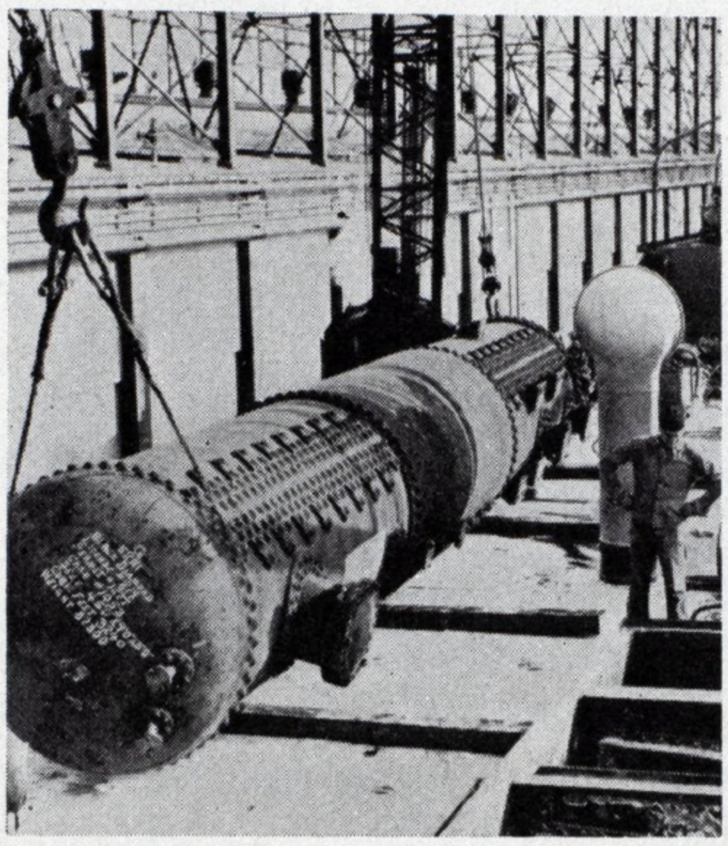
Power for Short Hauls

A QUESTION often raised when considering tractors and trailers for handling cargo on terminals is the economy of their use for short hauls. Statements have been made that they are not economical for hauls less than 300 feet. Current practice shows that contention is wrong. It is not economical to move heavy slingloads by hand even 50 feet. This is particularly so when floors are not smooth and smooth floors are in the minority. The wear and tear on the men and the slowness of the movement justifies replacing hand power by electric or gasoline power. I have seen six men around a trailer moving a slingload of 3000 pounds of tin. At another hatch, one man and a gasoline tractor did the job, regardless of floor conditions.

Tractors and trailers are particularly useful when equipped with automatic couplers and when handled by three wheel type tractors with short overall turning radius.

THIS page is being devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.



A Heavy Lift at Western Maryland Ocean Terminal at Baltimore

A Shipside Dock Crane

THE usefulness of shipside dock cranes was recently demonstrated at Baltimore. A ship was discharging sugar from No. 1 and No. 2 hatches. At No. 2 there were two booms and two winches. By connecting with blocks on the cargo mast on the terminal, cargo was discharged to upper deck of the shed. At No. 1 hatch only one winch being available, the entire operation was turned over to the ten-ton gantry crane. This crane not only did that which was practically impossible for the ship's gear but also discharged 50 bags more per hour than was discharged at No. 2 hatch.

Delays Due to Poor Design

DELAYS to the hook are prevalent at piers with narrow space between shed and stringpiece because the slingload must be made up within the shed and the load must be steadied before it can be hoisted overside.

Recently at a New York pier, a slingload of twenty 200-pound kegs of bolts and nuts was delayed 10½ seconds because of this condition.

A ship completed a few years ago had winch controls so far away from the hatch that winch drivers could not see what was going on. After the ship was delivered, make-shift controls had to be constructed.

Conditions such as these are the result of inadequate planning when the terminal or ship was designed. Thorough analytical studies are needed to co-ordinate knowledge.

Receptive to New Ideas

A NEW YORK stevedore recently made a pertinent remark which indicates the value of ideas from outside sources. A friend of mine described a new type of sling to him. The stevedore said, "We consider ourselves experts in stevedoring—we have handled millions of packages of this commodity and yet never thought of this type sling."

Regardless of a man's experience he can cut costs and improve service by getting new ideas from others. No man has a monopoly on ideas.

Ship designers need to give consideration to the effect that horizontal brackets, longitudinal stringers, and other similar constructions have where dirt can collect because holds frequently have to be washed out and swept down and all places where dirt can lodge increases cost and causes delay in this work.

Lumber in Unit Packages Saves Handling Costs and Avoids Damage

Fibreboard Packing Cases

(*Continued from Page* 49)

most suitable type should be based on the class of package being handled. The reason for the use of the spreader is to hold the slingload intact and to prevent the ropes coming in contact with the packages loaded on the platform. An ideal arrangement would be to hoist the commodity on board without any pressure on the packages, but this is often impractical and the next best plan is to distribute the pressure over a wider area of the slingload and increase or decrease the vertical or horizontal components of this pressure to suit the commodity handled. Fibreboard cases containing canned goods can stand the strongest pressure from the bottom or from the top, consequently the spreader to be used for this commodity should be one that would give the greatest vertical and the least horizontal pressure. To reduce the vertical pressure and yet not increase the horizontal pressure the spreader can be made a little longer than the length of the platform, twelve inches longer will reduce the pressure materially. The length of the spreader, the length of the sling used, whether the spreader is longitudinal or crossways, and the manner of fastening the slings to the platform, are the determining factors.

Experiments on the vertical and horizontal thrust in pounds against a slingload, at varying degrees angle of the ropes, for the usual customary spreader for a draft of 2000 pounds give the following results:

Draft	Inclination of Slings with Horizontal		
2000 lbs.	30°	45°	60°
Vertical	2000	868	316
Horizontal	1524	882	504

Similar experiments on an improved type of spreader, keeping in mind the objective of lessening the pressure, give the vertical and horizontal thrust in pounds as follows:

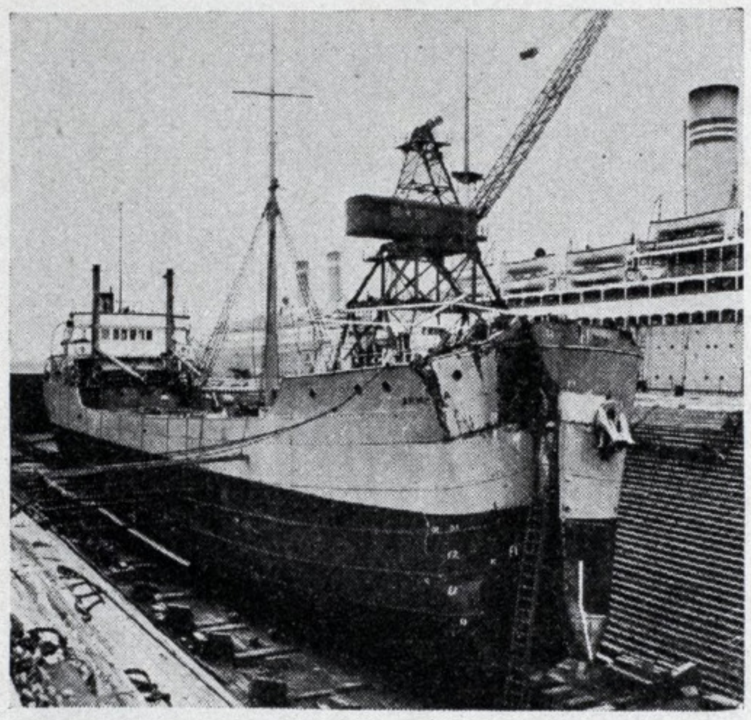
Draft	Inclination of Slings with Horizontal		
2000 lbs.	30°	45°	60°
Vertical	2000	828	312
Horizontal	830	474	288

The effect of different angles of the spreader ropes and the types of spreaders used are shown in the accompanying illustrations. It is thought the use of manilla rope slings and wooden spreaders is to be preferred to wire rope slings and steel spreaders.

The advisability of handling all commodities with care and particularly general cargo, cannot be over emphasized. Claims amount to large sums, but the indirect future loss of business to the shipper, caused by consignee receiving goods in a damaged condition, is probably greater. Important traffic is sometimes lost for years because of a claim. The shipper must maintain and strengthen the goodwill of his customers and he has a right to expect the transportation companies to do all in their power to deliver the goods to the consignee in as good condition as it is received. Properly designed slings, with adequate supervision and proper training, will greatly aid in accomplishing this objective.

Reconstruct Bow

Following a collision between the steamer ARMINDA, a coastwise freighter of the Hedger Transportation Co. Inc., and the steamer SILVERYEW of the Kerr Steamship



line, the ARMINDA was towed to the Robins plant of the Todd Shipyards Corp. in Brooklyn.

The remarkable feature of this job was the reconstruction of the bow without the aid of plans.

Great Lakes Red Book

THE Great Lakes Red Book, a vest-pocket directory giving the names of owners, operators, vessels and captains and engineers of all shipping on the Great Lakes is now out for the year 1931 *in its twenty-eighth annual edition. This convenient directory is published each year at Cleveland by* MARINE REVIEW *under the direction of A. H. Jansson, editor.*

The 1931 *edition of the Red Book lists over* 1200 *vessels of the Great Lakes, together with the names of owner, operator, captain and engineer of each vessel. There is also a complete directory of the shipbuilding yards on the Great Lakes containing the names of all the principal officers and giving the drydock, repair and building facilities at each yard.*

Individual vessels and fleets are alphabetically arranged. The capacities of all ore carriers are given and there is also a complete port directory.

Handling Costs at Seattle

(*Continued from Page* 50)

versed its total depth is only 7 inches compared to the customary 14 inches. Empty skids require only half the space. An advantage over the usual flat sling board is that in the ship's hold, the stringers under the deck permit them to be moved on dollies directly to point of storage.

Fewer handlings result from the use of the combination skid and sling board, effecting not only economy in labor but also increasing the speed of the operation and reducing damage to cargo. Incoming cargo is placed on skids in the hold and transferred from shipside to storage or freight cars. Outbound freight is placed on skids and then in storage from where it is moved direct to the ship's hold. Import cargo usually required additional handling as it must be sorted as to marks and is subject to customs inspection. When this is necessary, loads are broken down but are replaced on skids whenever possible.

Substantial savings over former hand truck methods are being shown by this new equipment. Naturally the quantity and type of goods handled have a bearing on the results but the following figures show the average labor savings on different types of cargo: Sacked goods, such as dried peas or peanuts are handled at a reduction of 80 per cent of former cost; baled pulp, 90 per cent; case goods, such as canned milk, 60 per cent. Bamboo, a light and expensive commodity to handle, shows a saving of 40 cents per ton or 50 per cent of the former charge. Conservatively speaking, in spite of the decrease in the volume of cargo tonnage in evidence at this time, this equipment has shown thus far a net return on the investment of about 30 per cent per annum.

In addition to the advantages and labor saving effected by the use of the skids, already outlined, the electric trucks are continually used for other tasks. Frequently they are pressed into service to spot cars on the waterside of the terminal, eliminating the need of calling for a switch engine. They have also effected closer co-operation between the steamship line, the stevedoring companies and the various other agencies delivering or receiving freight.

The success of any new material handling system depends first upon an accurate analysis of the problems involved, giving close attention to both present and future conditions, the selection of the proper equipment and the efficient management of the operation. To accomplish these results, calls for the hearty co-operation of the various departments and their officials.

Iron and Steel Products Used by Shipbuilding Industry

TOTAL annual demand for iron and steel products by the American shipbuilding industry is estimated at not less than $36,000,000. This appraisal of the importance of shipbuilding to the iron and steel industry was given members of the American Iron and Steel institute in New York, May 22, by H. Gerrish Smith, vice president, Bethlehem Shipbuilding Corp. Ltd., New York, who in presenting it recalled that the United States is celebrating its third centenary of shipping.

In Fig. 1 is shown percentage of wooden and of iron ship tonnage constructed in the United States and in Great Britain at 10-year intervals from 1850 to 1920 and discloses that while Great Britain was constructing one-half her tonnage of iron in 1863, this condition was not reached in the United States until 1900. Fig. 2 shows the transition from sail to steam in these two countries. Here again Great Britain led by reaching 50 per cent of steam tonnage for her entire mercantile fleet in 1884, while the United States did not reach this percentage until 1895, although she had led in the percentage of steam tonnage until after the Civil war.

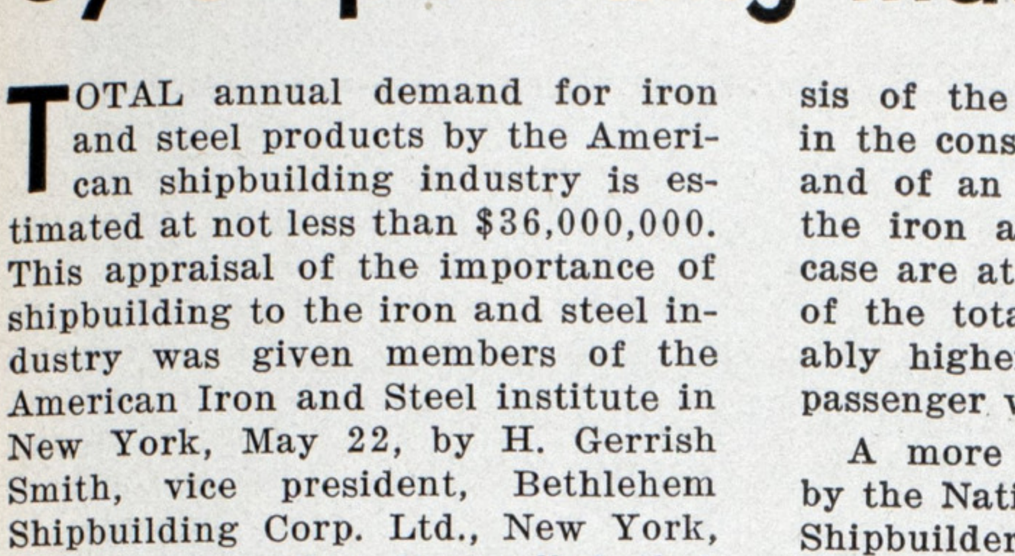


Fig. 1—Transition from wood to iron and steel in shipbuilding. Tonnage comparison between vessels built and registered in the United States and Great Britain expressed as percentage of total annual tonnage added

Some time ago, Mr. Smith supervised an analysis of the value and source of supply of each important group of material required in the construction of a typical $15,000,000 passenger ship with geared turbine drive. This analysis revealed that the money value of materials and equipment is $7,620,000. The materials may be divided into three groups as shown in the accompanying table.

A conservative estimate of the money value of steel and iron products in this typical vessel is $3,048,000, which is 40 per cent of the total material cost or 20 per cent of the total ship cost. A similar analysis of the material items required in the construction of a cargo vessel and of an oil tanker indicates that the iron and steel needed in each case are at least 30 and 35 per cent of the total ship cost, or considerably higher than in the case of a passenger vessel.

A more recent survey conducted by the National Council of American Shipbuilders shows that a composite shipbuilding program of the various types and numbers of ships that must be constructed annually to maintain our present tonnage of ships of all types and sizes upon the seas in both domestic and foreign trade requires a continuous annual expenditure of $75,000,000. Total value of material for this composite group of vessels is $40,264,200 or 53.7 per cent of the total. The largest group is machinery at a cost of $14,045,200 and the next largest group, structural steel and castings, at a cost of $10,472,000.

A conservative estimate of the total requirement for iron and steel products in this composite program is in excess of $20,000,000, which is 50 per cent of total material costs or 27 per cent of total ship cost. To obtain the total iron and steel requirements annually for the industry, there must be added to this figure $5,000,000 for government work in navy yards, excluding armor and guns; $3,000,000 for government work in private yards; $6,000,000 for work on Great Lakes and rivers; and $2,000,000 for work in ship repair plants. This gives the $36,000,000 figure mentioned at the outset.

(Main Engine is Broken Down into Basic items)

	Value
Group I	
Steel plates, shapes and sheets	$920,000
Rivets and bolts	126,000
Steel and iron pipe	84,000
Steel forgings	192,000
Steel castings	159,000
Iron castings	90,000
Wire cable and rigging	15,000
Anchors	9,000
Anchor chains	27,000
Boilers	640,000
Power doors	50,000
Reduction gears	210,000
Total of iron and steel items	$2,522,000
Per cent of total materials	33.1
Group II	
Deck machinery	$150,000
Engine room steam auxiliaries	60,000
Motors and generators	405,000
Valves	105,000
Gages	50,000
Hardware	90,000
Refrigerating machinery	135,000
Ventilation	100,000
Steam and electric pumps	180,000
Soot blowers	60,000
Heaters and evaporators	30,000
Thrust bearings	54,000
Tools	20,000
Rigging blocks	12,000
Galley outfit	150,000
Plumbing fixtures	150,000
Air compressors and separators	12,000
Total of items made largely of iron and steel	$1,763,000
Per cent of total materials	23.2
Group III	
Other materials containing little or no steel or iron	$3,335,000
Per cent of total materials	43.7
Total materials	$7,620,000

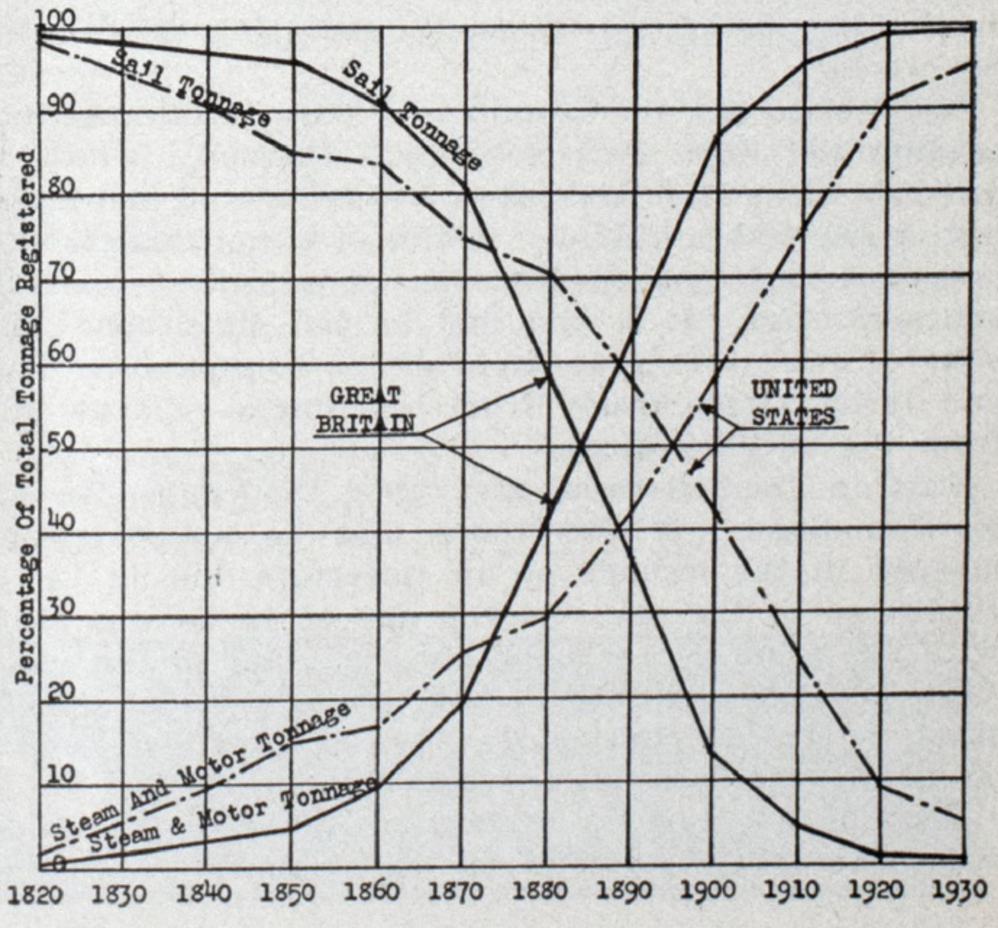


Fig. 2—Transition from sail to steam in shipbuilding. Tonnage comparison between vessels registered in United States and Great Britain expressed as percentage of total tonnage registered

Personal Sketches of Marine Men

Capt. Patrick Francis Donnelly, Isthmian Steamship Co.

By Ben K. Price

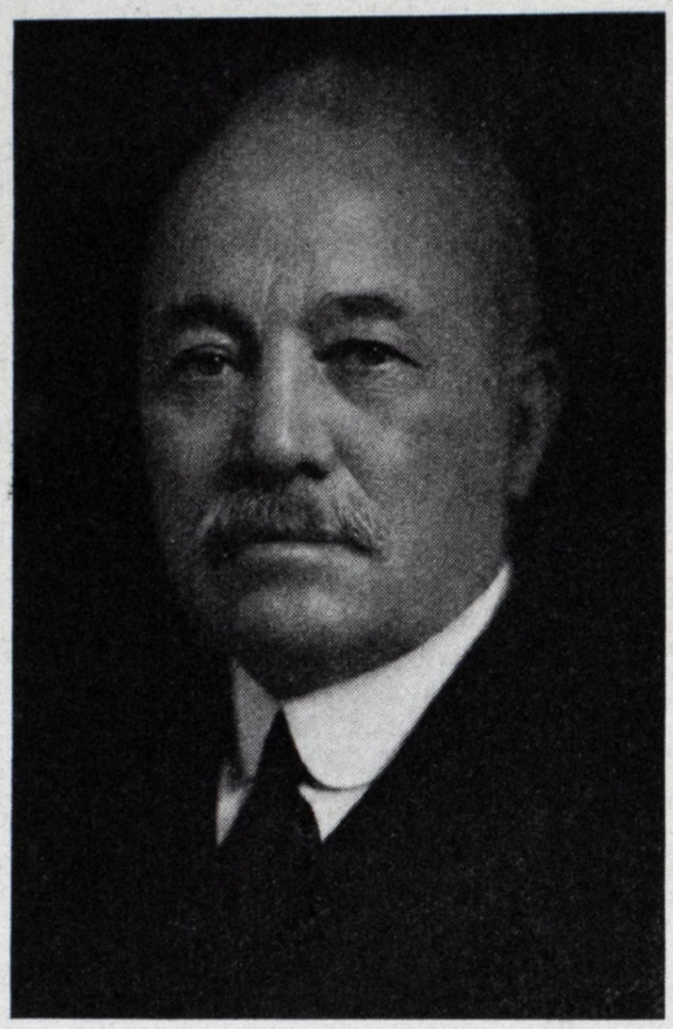


Photo Blank & Stoller

FOR twenty years as marine superintendent of the line, he has built up an efficient personnel afloat.

OF SEAFARING stock, his experience at sea began early in the hard school of the sailing ship.

A KEEN understanding of human nature, a mixture of tolerance and discipline, enter into his life.

IN THE retirement of Capt. P. F. Donnelly, of Isthmian, shipping has lost from active service one of its most forceful and picturesque figures. Reared in the traditions of the sea from early youth, the son of a shipmaster and the grandson of a shipmaster, the captain retires after more than 55 years in service in which he has written achievement with a bold and colorful hand.

Captain Donnelly's retirement comes as a result of the newly established policy of the United States Steel Corp., the parent organization, through which all employes are automatically retired at the age of 70. Still vigorous in body and mind, he will now be able to devote more time to the many interests of a full and busy life.

The Captain has been marine superintendent of the Isthmian Steamship Co. since the company's first inception, over 20 years ago, and he has contributed materially to its growth and prosperity. He has seen the number of ships owned, increase from one to 39, operating in all parts of the world.

Needless to say, the captain is of pure Irish descent. His grandfather, Capt. Patrick Francis Donnelly, whose name he bears, came from Ireland to Newfoundland and later was lost at sea with all hands. Hence, it is not strange that he possesses that fine combination of qualities—fearlessness and sentiment. It is said that he can dig deeper into his poke of Irish lore than most of his compatriots. Ballads and lyrics ripple freely from his tongue—a true pilgrim from the Blarney stone.

Captain Donnelly was born upon the rugged sweeps of Newfoundland. It was there that he not only became steeped in the legends of his ancestors, but in the stern traditions of the sea. At the age of 12 he was shipping with his father up the Labrador coast, and at the age of 16 made his first trip across the ocean, a sailor before the mast, on the brigantine RAVENSWOOD, destination Bristol, England, cargo seal oil and seal skins.

Next he sailed on the brigantine HIGHFLYER, in the South American trade, and later on the brigantine LIZZIE, which foundered in mid-ocean. The young sailor and all other members of the crew were rescued and taken to Cork, Ireland, then to Bristol, England, where he shipped on the English brigantine SUNBEAM for Newfoundland.

Then came his first command, the 200-ton schooner THERESA, in the West Indies trade, then the 250-ton brigantine CLEDDU BELLE, which he commanded for five years in the trade between Newfoundland and the Southern European countries, principally the Mediterranean, carrying fish in bulk outward and salt homeward.

His last command in sail was the brigantine PLYMOUTH, which foundered in mid-ocean in 1897. The rescue of Captain Donnelly and his crew furnishes one of the most thrilling chapters in the annals of shipping and served as the captain's first introduction to steam.

The crew was rescued by the S. S. CAMBRIAN, of London, but as soon as all were safely on board the gale increased in violence, waves mounting in height. That night the thrust shaft broke and the ship at the mercy of the seas rolled to dangerous angles. At times it seemed as if she would turn turtle. Four times was she taken in tow by various vessels, twice, at different times, was she reported lost with all hands on board by ships which had come into port after first attempting assistance. One ship, S. S. VALA, broke her tow line four times in an effort to help the disabled CAMBRIAN, and then stood by for a week before finally losing sight of her. When the CAMBRIAN was brought into port considerable time later it was to many people in the nature of a resurrection, and the press from one end of the country to the other and abroad carried the story of man's desperate fight in overcoming the elements.

This, may it be repeated again, was Captain Donnelly's first introduction into steam. Then began a new phase of his sea training. He went to London, soon to ship as third officer on the 12,000-ton S. S. MEGANTIC, of the Wilson Furness Leyland lines. In the nine years which followed he rose to the position of chief officer, crossing the Atlantic between London and Boston 142 times. With this training in steam, he became master of the S. S. VIRGINIAN, of the

Leyland line, later to be transferred to the Furness Withy line in command of S. S. MARIANA. His next command was the S. S. POTOMAC, of the same line, engaged in trade between North and South America.

In 1910 Captain Donnelly became marine superintendent of the United States Steel Products Co., export subsidiary of United States Steel Corp. and operated under the trade name of the Isthmian Steamship lines. Incidentally, the Isthmian line was organized in London, and James A. Farrell, there at the time, gave the company its name, Isthmian, inspired, so it is said, by the anticipated opening of the Panama canal. In the summer of 1914, at the outbreak of the World war, all Isthmian ships were transferred from British to American registry, to be operated by the United States Steel Products Co., under the Isthmian trade name.

Capt. Donnelly is an honorary member of the Maritime Exchange and of the Alumni association of the New York State Nautical school. He has done much to promote the proper training of boys for the merchant marine. His annual address to each graduating class has long been a feature of the occasion.

Recently, in New York, 200 of his friends in the shipping world, or as many as could be accommodated, tendered him a testimonial dinner, at which he was toasted as the dean of American ship captains.

The captain sailed May 16 on the S. S. STEEL EXPORTER, on a trip around the world. The sailor is on a holiday.

I.M.M. Shows Lower Net Profit During 1930

The annual report of the International Mercantile Marine Co. for the year ended Dec. 31, 1930, shows a net profit of $1,252,284, after depreciation on steamers, bond interest, charges and taxes. This compares with net of $2,423,350, after the above charges, in 1929.

The 1930 net is equal to about $2 a share, while that of the previous year was equal to about $4 a share.

The severe decrease in the American export and import trade and the reduction in travel caused the lower net for 1930.

During the year the company completed negotiations for the Roosevelt Steamship Co. Inc. No cash consideration was involved in the transaction, 25,000 shares of International Mercantile Marine no par value stock being given for the entire capital stock of the Roosevelt company.

Earnings for the first three months of this year have not equaled those for the corresponding period of 1930, the report states, and no improvement is predicted for the near future.

World's Largest Dock

The Southern Railway Co. recently placed a contract for the construction of the world's largest graving dock with John Mowlem & Co., Ltd., London, which is to be ready by the autumn of 1933 in order to accommodate the new giant 73,000-ton Cunarder now building on the Clyde.

The cost of the new dock, including extensive dredging operations, is placed at about $9,250,000 and its construction will give employment to many thousands of men. Preliminary plans have been completed and the work of excavation will begin shortly. It will be necessary to excavate to 87 feet below the quay level, and this will involve the removal of about 1,250,000 tons of material.

The graving dock which will be located at Millbrook, Southampton harbor, is to be 1200 feet long, 135 feet wide at the entrance, with a depth of 45 feet to the top of the blocks at high water. These dimensions will make it the greatest dock of its type in the world as the present 60,000-ton floating dock at Southampton is a record holder.

The length of the new Cunarder which the dock will be ready to accommodate in the fall of 1933, will be 1018 feet and her beam 115 feet.

Lake Ferry Sets Record

An ocean liner would have to sail four times around the world in one year without laying up for repairs to equal the record recently established by the carferry CITY OF FLINT, on Lake Michigan. This ferry, owned by the Pere Marquette railroad, made 1010 trips in 363 days without a lay-up for repairs. The length of each trip is just 100 miles, making a total of 101,000 miles covered in all.

The CITY OF FLINT, flagship of the Pere Marquette carferry fleet on the Great Lakes, was built by the Manitowoc Shipbuilding Corp. and is equipped with General Electric propulsion equipment. It was in continuous service from April 8, 1930, to April 6 this year when it entered the shipyard at Manitowoc for government inspection. Up to the time it left the run, it had operated continuously, including day and night service in all kinds of weather, spending only two hours in port for loading or unloading freight cars.

Todd Shipyard Profits

The annual report of the Todd Shipyards Corp. issued May 21, showed net income of $927,980 for the fiscal year ended March 31. William H. Todd, president, in his statement to the stockholders, points out that extensive improvements costing approximately $1,800,000 were made at the various plants. These improvements were made out of the funds of the corporation without borrowing, aside from a purchase money mortgage of $142,500. Liberal reserves, he stated, have been provided for depreciation and contingencies and the company is in excellent position to derive the fullest benefits from the business revival, when it does come.

Appointed Representative for New York S. B. Co.

James Swan, for a number of years superintendent of marine construction of the New England Steamship Co., has been appointed New York representative of the New York Shipbuilding Co., Camden, N. J.

Graduating from the Massachusetts Institute of Technology in 1891, Mr. Swan studied naval architecture at the University of Glasgow. Beginning his practical work with the Newport News Shipbuilding & Dry Dock Co., he joined the New York Shipbuilding Co. in 1900 as chief of the hull scientific department. He continued with this company for 17 years, the last five of which he was assistant to the president.

In 1917 he accepted an appointment as general manager of the Herreschoff Mfg. Co. and in 1921 he became president of the Groton Iron Works. Prior to his connection with the New England Steamship Co., he served as editor of *Marine Engineering and Shipping Age.*

Club Re-elects President

E. F. Clark, president of the Propellor club, Port of New York, was unanimously re-elected to head the club for another year at the annual election held May 15 at 56 Broad street, New York. A. M. Tode was named vice-president; W. Z. Gardner, secretary, and J. H. Thompson, treasurer.

The following were named members of the board of governors: Benn Barber, J. A. Erickson, W. C. Gray, J. J. Nelis, E. M. Roberts and R. H. Wager. Their terms expire March 31, 1934.

All speed records for vessels of her class were recently shattered by the French destroyer ALBATROSS on her recent trial off L'Orient, the vessel reaching a speed of 42½ knots and at times 43. The speed exceeded the expectations of her designer, the contract calling for 37 knots and 70,000 horsepower. On her trials the ship developed 90,000 horsepower.

Specifications for Welding Steel Determined by Curve

POROSITY of weld or deposited material has constituted a baffling problem in the application of electric arc welding. What causes one weld to be solid and dense and the next to be porous? Variability in the steel itself is believed to be the answer.

As a result of extensive research on this subject, Wilmer E. Stine, research laboratories, Lincoln Electric Co., Cleveland, reached conclusions enabling him to develop a graphic formula, known as the Lincoln-Stine equilibrium curve, by which it is claimed that exact specifications for steels of good weldability can be determined.

Difficulties encountered in producing sound welds in various grades of steel heretofore were thought to be due to the electrodes and process employed, but the investigator believed the difficulty lay within the steel. To prove this contention, research beyond the usual analysis of steels was necessary. Data were collected from steel producers as to exact conditions and methods under which the steel samples to be tested were made. With this information, thousands of samples were welded, tested and analyzed, the results forming the basis for the curve.

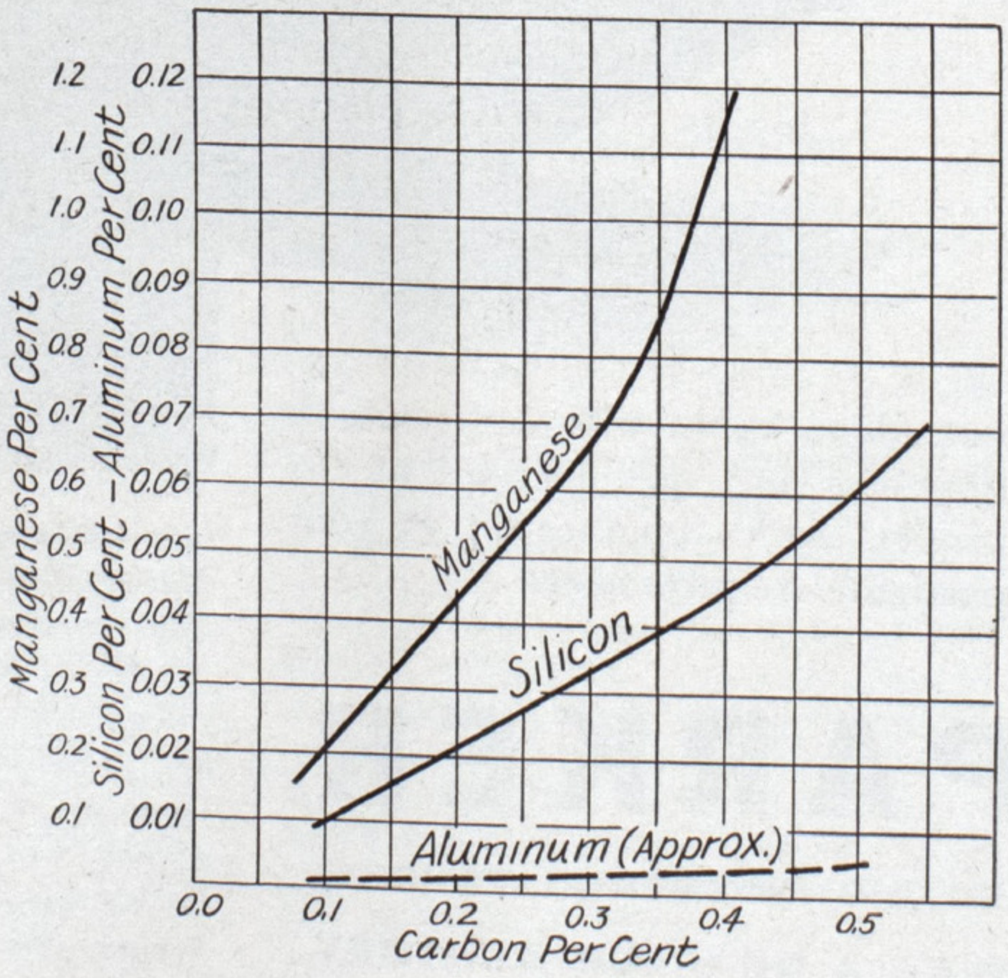
Formula Indicates Analyses

How to determine the correct proportions of the elements in the steel for best welding is said to be a simple matter when using the accompanying graphic formula. For example, if steel having 0.20 per cent carbon is required, the curve shows that the silicon content should be approximately 0.021 per cent and manganese 0.40 per cent.

If the steel has been deoxidized in manufacture by addition of aluminum, the amount of this element present should not be more than 0.002 per cent. The aluminum content should be avoided or kept low because aluminum content is difficult to determine by analysis, and the presence of aluminum oxide is objectionable because of its high melting temperature which lies between the maximum steelmaking temperatures and maximum arc welding temperatures.

In arc welding steels, produced according to the equilibrium curve, there is said to be no chemical reaction when the temperature of the metal falls to the point only slightly above the temperature at which steel solidifies. It is only when such chemical equilibrium is obtained that minimum porosity of weld metal is assured, which in turn, means denser, stronger, tougher welds.

In conducting the research, the investigator also felt that in steels not having the proper proportions of elements for good welding, chemical equilibrium at the proper temperature might be brought about by the use of a corrective flux or autogenizer fused into the steel during the welding process and during the research developed fluxes or autogenizers for this purpose. Thus, when it is found that the composition of the steel on hand does not meet the requirements indicated by the graphic formula, the steel can many times be satisfactorily welded when such balancing flux or autogenizer is applied.



Curve for determining analysis of steels best adapted for arc welding. For example, the proper analysis for an 0.18 per cent carbon steel is shown to be 0.019 per cent silicon and 0.37 per cent manganese. Aluminum additions should be avoided or kept very low

---

John Watt was elected vice president and general manager of the Kensington Shipyard & Drydock Corp. at the meeting of the board of directors at Philadelphia Mar. 17. Mr. Watt has been associated with the corporation since February 1928 when the Kensington Shipyard & Drydock Corp. was purchased from the Wm. Cramp & Sons Ship and Engine Building Co.

Secretary Mellon Attends Coast Guard Exercises

SECRETARY ANDREW MELLON of the treasury laid the cornerstone of the new Coast Guard academy at New London, Conn., on May 15 and attended the graduation exercises while Rear Admiral Billard gave commissions to the 33 cadets who were graduated as ensigns. In his address to the graduation class, Mr. Mellon praised the record of the service and congratulated the young men on becoming part of the organization. The illustration shows Ensign C. B. Arrington of Baltimore, honor student, being congratulated by Secretary Mellon for winning the McAllister award for proficiency in engineering and having the highest average in his three years at the academy. His three years' average was 92.54.

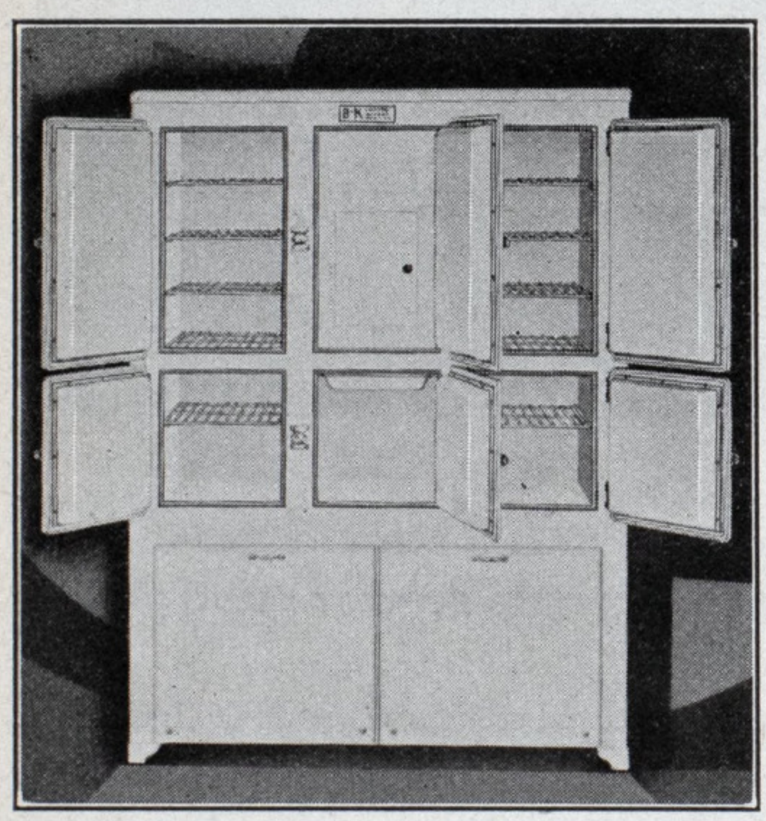
Consolidated net income of Atlantic, Gulf & West Indies Steamship lines and subsidiaries, as shown by the annual report for 1930, amounted to $589,533, a decrease of $2,280,381 from the 1929 figures.

Equipment Used Afloat and Ashore

Small Refrigerator and Water Cooler Developed for Use on Shipboard—Compact, Light weight Condensing Unit for Geared Turbine Towboat

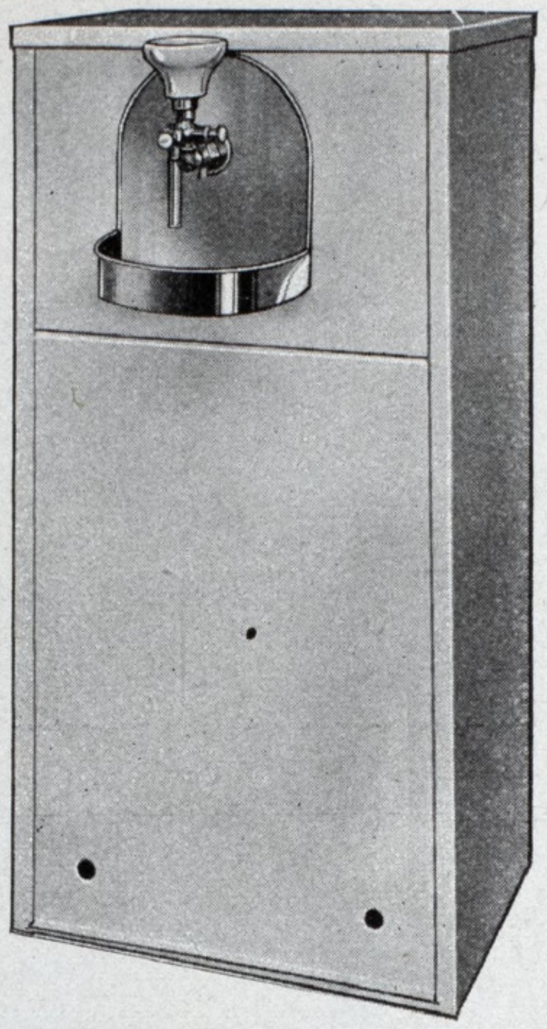
THE small refrigerating unit produced by the Brunswick-Kroeschell Co., engineers and manufacturers of refrigerating machinery, New Brunswick, N. J. will be of interest to marine users to fulfill those needs for which the installation of the company's other refrigerating equipment would be uneconomical. The experience of the manufacturer with problems on shipboard has resulted in the design of apparatus especially adaptable for this class of trade.

The B-K Junior, as the small unit is called, is constructed along simple rugged lines and contains no intricate or complicated mechanism. It operates on the same refrigerating cycle as the larger Brunswick-Kroeschell compressors. The entire condensing unit, namely, the compressor, condenser and motor, is mounted on a single compact base, but at the same time all parts are readily accessible for adjustment or repair, a most important factor in marine refrigeration.



Model LP-150 Refrigerator, Brunswick-Kroeschell Product

The compressor is air cooled, but either air cooled or water cooled condensers may be furnished as standard, depending upon the service for which the unit is intended. Evaporator coils are designed to fit any type of refrigerator or any small storage compartment. Control is completely automatic, a pressurestat or thermostat being used which is of such design that it cannot be affected by the most extreme rolling or pitching of the vessel. Where a single machine operates on more than one refrigerator, or on a refrigerator or scuttle butt, individual automatic control is maintained in each unit to be cooled.



Water Cooler, Bubbler Type, Made by Brunswick-Kroeschell Co.

The small unit is manufactured in sizes requiring from 1/6 horsepower to 1½ horsepower motors. Where electric current is not available, the set may be equipped with a small gas engine connected to the compressor by means of V belt drive. The engine is mounted on a common base with the entire condensing unit.

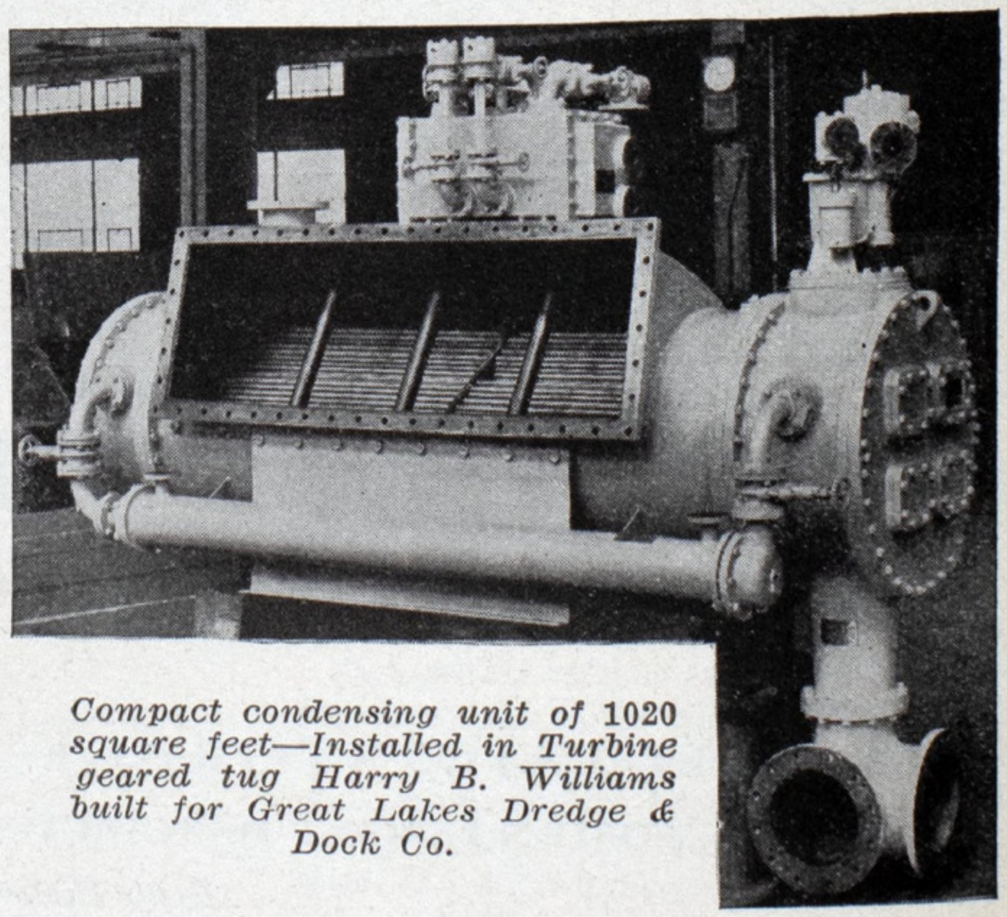
In addition to the refrigerating unit itself, there are available individual refrigerators, ice cream cabinets, scuttle butts and ice making sets of size and style most suitable for the specific need of each vessel. The refrigerating unit may be contained in the base of the refrigerator or scuttle butt, if desired, in such a manner that the entire equipment will be self-contained. Repair parts are available at various ports. This unit is recommended for small yachts, tug boats, small dredges and vessels having limited refrigeration requirements as well as for larger vessels for cooling isolated pantry and small special refrigerators, scuttle butts, ice cream cabinets, etc., where the location makes it impossible or undesirable to connect into the central refrigerating system. The evaporator coils may be equipped with trays for the manufacture of ice cubes, and where a large number of ice cubes is required, special ice cube making sets may be furnished.

Marine Condensing Unit Has Novel Features

THE novel 1020 square feet condensing unit illustrated on this page, designed and built at the South Philadelphia works of the Westinghouse Electric & Mfg. Co., is said to be the smallest, most compact, lightweight assembly of marine auxiliaries ever built. One foundation supports four pieces of apparatus, the main condenser, circulating pump, air ejector, and the oil cooler. The double-banked two-stage steam jet air ejector is located on top of the main condenser and on the right-hand end built into the water box is the turbine-driven propeller-type circulating pump. Mounted on the side is the single-pass oil cooler which receives water from the main injection. The steel plate shown in front is one of two supports which form a foundation for the complete unit. The position of the exhaust opening and the use of flexible supporting plates make an expansion joint unnecessary. When expansion occurs the plates simply give, and the whole condenser moves slightly to one side.

This condenser will be part of the equipment for the first geared-turbine tugboat in the world and the first geared-turbine vessel ever to be placed in service on the Great Lakes.

The towboat in which this condenser is installed was launched March 21, at Manitowoc, Wis., and christened the HARRY B. WILLIAMS for the treasurer of the Great Lakes Dredge & Dock Co., owner.



Compact condensing unit of 1020 square feet—Installed in Turbine geared tug Harry B. Williams built for Great Lakes Dredge & Dock Co.

Waterway Transportation

(*Continued from Page* 36)

in the meantime earnings and profits would increase, placing the entire enterprise on a sounder basis. It would also result directly in rapidly building up the movement of freight by water.

The river freight terminal is in the final analysis the determining factor in development of waterway transportation. If the lines, as pointed out by General Ashburn in the opening paragraph of this article, should spend more money for handling freight at their loading and unloading terminals, than it costs them to carry that freight between the two points, it is obvious that the earnings made possible by low cost transportation will be spent in excessive handling costs. The unsoundness of this situation is readily appreciated since with business on that basis low transportation costs are more than made up for in high handling charges. No system of transportation, regardless of how efficient its carrying equipment may be, can hope to develop to its greatest possibilities as long as the freight moving over it is loaded and unloaded inefficiently and consequently at great expense.

In order that transportation on the inland waterways of the country be developed to its greatest extent, it is absolutely essential in the first place, that modern boats and barges be operated, that freight be handled efficiently and economically, that the inland waterway barge lines be in direct contact and co-operation with the railroads. Joint rates should be established for every territory which can use waterway transportation. In addition to joint rates, the rates charged by the barge and boat lines themselves should be stabilized, so that one large line by reducing rates would not be able to stifle competition with other lines.

During the history of waterway transportation, three factors have been instrumental in retarding its development. They are, in order of importance: First, failure on the part of river interests to establish suitable and efficient terminals; second, failure on the part of railroads to establish joint rates with the water lines; and third, tendency on the part of river, boat and barge lines to maintain a varying level of freight rates, which results in conflict between the lines themselves, misunderstanding and lack of confidence.

If waterway transportation is to develop to its maximum extent, every one of the three factors referred to above must receive careful consideration. As long as these conditions remain, transportation on the inland waterways will be greatly restricted. Even though it will increase—and it is bound to increase—it will, however, fall short of its ultimate possibilities.

Towns and cities of any importance located on an inland waterway where large traffic is available should construct suitable terminals for the handling of freight, with direct means of transferring freight from rail to barge. The extent to which these facilities are developed, will determine the fate of inland waterway transportation.

With an improved and co-ordinated system of inland waterways, and the operation of modern economical boats in regular services over them, and the handling of freight through efficient and economical terminals, the possibilities of inland waterway transportation development are practically unlimited.

When one stops and considers the fact that waterways already improved and those under improvement extend from the richest agricultural section of the country to the most highly developed industrial sections and to a direct connection with ocean shipping at seaboard; and the fact that in the near future, this great system will be co-ordinated with the Great Lakes, it can be realized just how great is the importance of the inland waterways to the economic welfare of the country. In years to come, when all of the waterways under improvement are finally completed, and this whole system is connected with Lake Michigan and Lake Erie as it is to be, the 245 millions tons which moved in 1929 over the rivers, canals and connecting chan- significant by comparison with the tonnage then moving.

Order New Diesel Vessel

Contract to build a wood motorship for the bureau of Indian affairs of the department of the interior has been awarded to the Berg Shipbuilding Co., Seattle, on a low bid of $389,390.60. This figure includes a 1500 brake horsepower trunk piston type McIntosh & Seymour diesel engine. Eight Puget sound and California yards submitted tenders, fourteen diesel make engines being included.

The vessel will be 225 feet in length, will have a speed of 14 knots and accommodations for thirty passengers. Surgical and dental clinics will be maintained aboard. The vessel will replace the wood motorship BOXER which the department has used for years in shipping supplies to stations in Alaska. The new vessel will be delivered in nine months in time for the season of 1932, the BOXER being in service this year. Plans for the new craft were prepared by W. C. Nickum, naval architect, Seattle.

Announcement was made on May 9 by A. P. Homer, general manager, of the completion of plans for moving the plant of Charles Cory Corp., manufacturers of marine instruments, telegraphs, and other intercommunication equipment, from 68 King street, New York, to the factory of Pioneer Instrument Co., 754-770 Lexington avenue, Brooklyn.

Launch Two Cargo Vessels for Canal Operation

The first of two cargo vessels which will be operated by the Ford Motor Co. between River Rouge, Mich., and Edgewater, N. J., was launched May 9 at the River Rouge plant of the Great Lakes Engineering Works. The second ship was launched May 16, and both craft will be delivered to the owners by June 1, according to J. A. MacDonald, president of Henry J. Gielow, Inc., the designers.

Each ship is 300 feet long, 43 feet beam, 20 feet molded depth and draft is 10 feet. They will carry crews of 17 men and will have cargo space for 2000 tons of boxed goods. The ship which was launched has been named the CHESTER.

Each ship carries a pair of 800-horsepower geared turbine engines driven by steam from oil-burning boilers operating at a working pressure of 400 pounds per square inch and 200 degrees superheat.

The motors may be started, accelerated or stopped without signals to the engine rooms, and a telemotor device provides the pilot houses with electric steering control.

The throttle control system is electrical, and will connect directly to the same shaft which is operated from the throttle lever in the engine room. The control mechanism in the wheelhouse will be similar to the standard double faced engine telegraph. A Sperry revolution indicator system will keep those in the wheelhouse informed as to just what the engines are doing at all times. The vessels are also to be equipped with Sperry gyro-compasses.

Calvin Austin, former president of the Eastern Steamship Lines Inc., Boston, recently resigned as chairman on advice of his physician. He retained his board membership.

Lump Sum Agreement Made

The shipping board on April 29 approved an operating agreement negotiated by the Merchant Fleet Corp. with the Tampa Interocean Steamship Co. of New Orleans, for operation of the American Gulf Orient line on the basis of a lump sum payment of $25,000 per voyage, the operator to assume all repairs up to $7500 per voyage. The estimated number of voyages for the coming year is 16.

The American Gulf Orient line is a cargo service operating 10 vessels between Gulf of Mexico ports of the United States and China and Japan, voyages being made via Pacific coast ports of the United States and Honolulu. It was formerly operated by the Tampa Interocean Steamship Co. under an agreement negotiated in 1924.

Atlantic Passenger Trade

(*Continued from Page 29*)

German lines, were able to construct their schedules on a weekly basis; the Inman line indeed advertised two sailings per week during the summer months.

Sad to say, the Americans were no longer in the running. Not merely had their sailing packets been outdated, but they had for various reasons been led to drop out of the ranks of the steamship lines also. Yes, that Guion line was of American origin, its proprietors having previously been leaders in the sailing packet field; but in turning to steam in 1866 they found it advisable to carry on with steamships of British registry.

In speed not very much of an advance had been made, due to the limitations of the simple single-expansion engine. As compared with the 13 knots of the Collins steamers of 1850, the leadership on the Atlantic in 1868 was disputed for at 14½ knots by the SCOTIA, CITY OF PARIS, and RUSSIA, not to forget the PEREIRE and VILLE DE PARIS. In the following year was completed the CITY OF BRUSSELS, which did manage in the course of her career to merit a rating of close to 15 knots.

It was at the beginning of the 1870's that the passenger liner first appeared in its modern form, as introduced by the White Star line on the occasion of the later's entry into the transatlantic trade.

Till then the passenger quarters aboard ship had been laid out according to the traditional style of locating the saloon section in the after part of the vessel. This arrangement was satisfaction enough in connection with the sailing packets, as also the paddle steamships. But when the screw propeller gradually supplanted the paddle wheel in the course of the 1850's and 1860's, an awkward situation arose; in screw steamers the working of the propeller subjected the aristocratic after part of the ship to a degree of vibration that was decidedly unwelcome.

The White Star line solved the problem by the simple plan of establishing the first cabin passenger quarters in the central section of the ship instead, as is the universal custom today. Supplementing this with various other modern innovations the company inaugurated its service in 1871 with the finest fleet of steamers on the Atlantic.

Compound (double-expansion) engines also came into their own in those years. Their virtue lay in superior economy of fuel consumption, a corollary of which lay in the possibility now of raising speed standards to new levels. Accordingly we have the record time of passage across the Atlantic, over the Queenstown-New York course, reduced to within seven and a half days, in consequence of a speed of 16 knots.

Full advantage was not taken until the earlier 1880's, when that great race for faster and faster greyhounds really commenced, and "blue ribbon" speed rose within the space of a half dozen years from 16 to 19 knots. This brought with it the increase in size of steamships, rendered necessary by the physics and economics of steamship operation.

Triple-expansion engines and twin screws arrived in the latter 1880's, providing further resources for advance in speed. In the middle 1890's, then, we see the "blue ribbon" of the Atlantic held at 22 knots by the CAMPANIA and LUCANIA of the Cunard line, these bringing the record time between Queenstown and New York down to five and a third days.

Speed Records Held By British

While this speed leadership of course changed hands from time to time, it always remained with the British lines. The Germans, as also the French, did approach the Queenstown-Liverpool record breakers in designing their greyhounds, but made no attempt actually to equal them.

Their sagacity was proven by the actual figures. In those years the North German Lloyd carried more passengers to New York than did any other line. On an average in fact, the Lloyd transported about twice as many as any other except the Hamburg-American Co., which itself surpassed the British companies in attracting patronage. So the British were considered perfectly welcome to the glory, as long as the Germans themselves got the business!

This remarkable showing was largely due to the overwhelming lead of the Germans in the transport of emigrants. Still their hold on the cabin passenger traffic itself was enviable.

With the transfer of the service of the Inman line from the Queenstown-Liverpool route to the Southampton run in the winter of 1892-93, in connection with that company's reorganization under the style of American line, under the American flag, the Germans lost their geographical advantage, as their steamers were now directly confronted with a fleet that had just clinched the world's records for speed.

In order now to maintain their prestige in the trade the Germans at last went the limit in the designing of new express steamers, and for the first time in about forty years the British were beaten for the records. For exactly ten years—September, 1897, to September, 1907—the "blue ribbon" of the Atlantic was held by the German companies, who disputed between themselves for it at 23½ knots with that notable series of greyhounds, the KAISER WILHELM DER GROSSE, DEUTSCHLAND, KRONPRINZ WILHELM, KAISER WILHELM II, and (at the very end) KRONPRINZESSIN CECILIE.

It should be mentioned that the British lines deliberately refrained from challenging the Germans again for the speed honors, having become altogether disgusted with the expensive nature of such a rivalry. Instead they developed a new and very profitable type of ship, the giant intermediate liner, of great size and capacity together with moderate and comfortable speed, which was so enthusiastically received by the traveling public that both British and Germans concentrated on this new feature. So from 1901 to 1909 the Atlantic ferry was enriched by the CELTIC, CEDRIC, BALTIC, CARONIA, CARMANIA, AMERIKA, KAISERIN AUGUSTE VICTORIA, ADRIATIC, ROTTERDAM (a Dutch liner), and GEORGE WASHINGTON, ranging from 20,000 to 25,000 tons gross, and rating at from 16½ to 18 knots with the exception of the GEORGE WASHINGTON, a 19-knot ship.

It was in those years that immigration to the United States reached its maximum volume. After having risen to nearly 800,000 in the year 1882 the annual rate had fallen off again, hovering about the 500,000 mark for some years and finally dropping to the 200,000's in the course of the 1890's. Early in the present century a decided recovery set in, and after successively setting new records the rate reached 1,285,349 for 1907, the greatest number of immigrants ever admitted to the United States in the space of one year. This figure was all but tied again in 1914 at 1,218,480, and would no doubt have been exceeded in subsequent years but for the World war.

Though the British companies had definitely decided to abandon the expensive contest for speed leadership, the British government, interested in the naval importance of fast merchant steamships, induced the Cunard line to return to the race, advancing to the company considerable financial aid for the purpose. By adopting turbines as the propulsive agency for the new ships it was possible to attain a power which, though possible, was not practicable in connection with the hitherto universal piston engines. As a consequence of the aim to set a new mark for speed with the vessels, it was necessary to provide for unprecedented dimensions, so that upon completion the LUSITANIA and the MAURETANIA registered well over 30,000 tons gross apiece. Duly taking first place on the Atlantic they steadily advanced the records for speed over a period of three years, so that by the end of 1910 these stood at 26 knots, the time between Queenstown and New York being reduced to less than four and a half days.

(*To be Continued*)

Marine Review

Reg. U.S. Pat. Off.

The National Publication Covering the Business of Transportation by Water

June, 1931

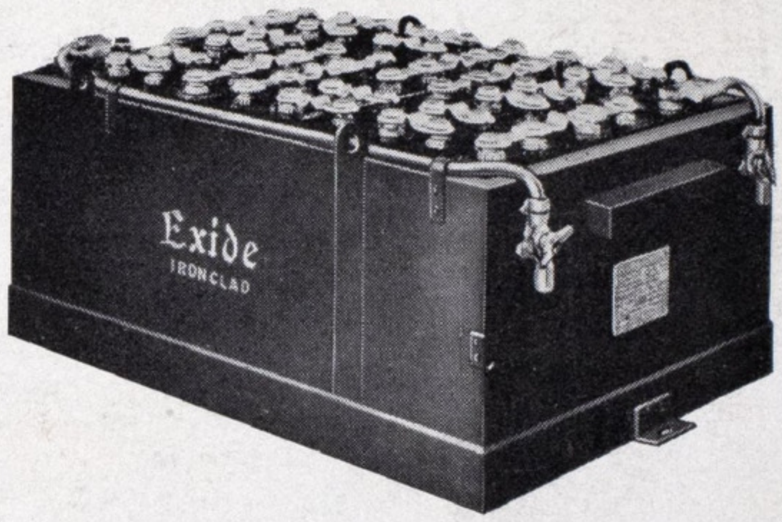
Handle Cargoes with

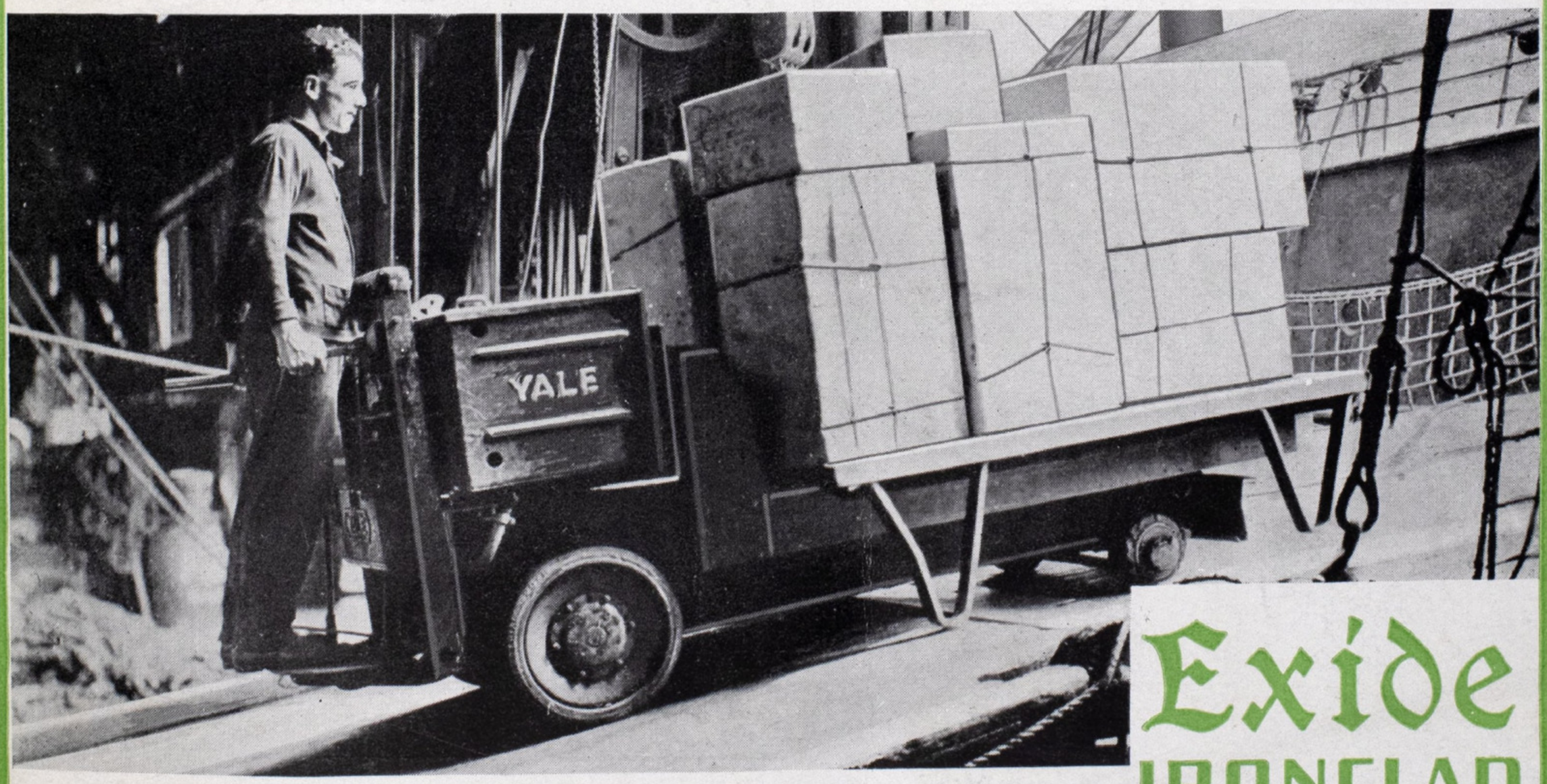
EASE, SPEED and ECONOMY

You can do it with an Exide-Ironclad-equipped electric truck

EVERY day they are on the job, electric industrial trucks powered with Exide-Ironclads prove their worth. Ask *any* owner. He'll tell you how these tireless stevedores of the docks save him dollars.

The dependable, low cost operation of their trucks is due to the decidedly different construction of the Exide-Ironclad Battery. Let us prove how we can save *you* money on material-handling costs. Write for bulletin, "The Adaptability of Electric Industrial Trucks and Tractors."



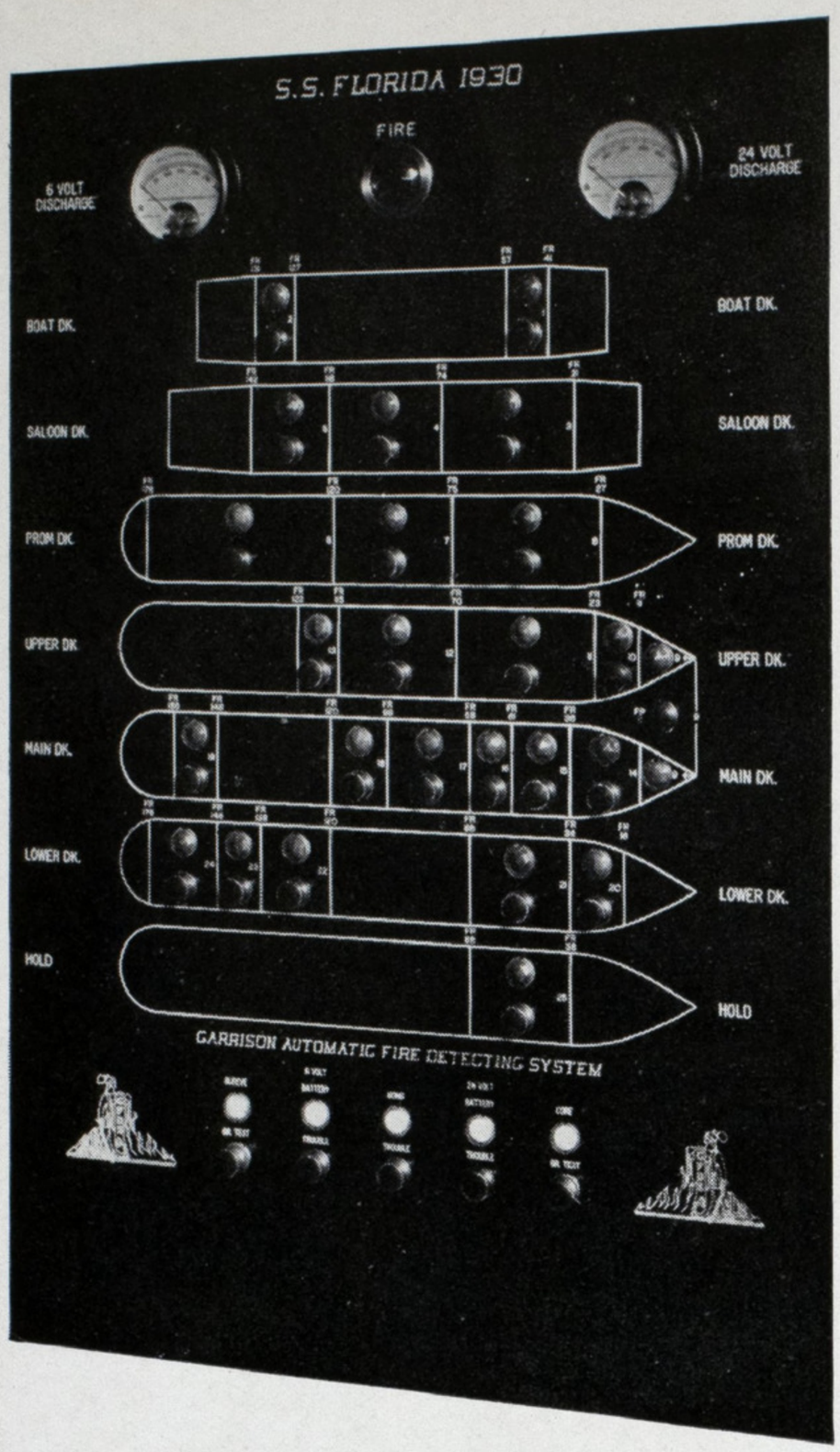


THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES



FIRE SAFETY on the S. S. FLORIDA

Cargo spaces and Passenger Quarters is afforded by

GARRISON

OWNER—

THE PENINSULAR AND OCCIDENTAL STEAMSHIP COMPANY

DESIGNER AND SUPERVISING ARCHITECT—

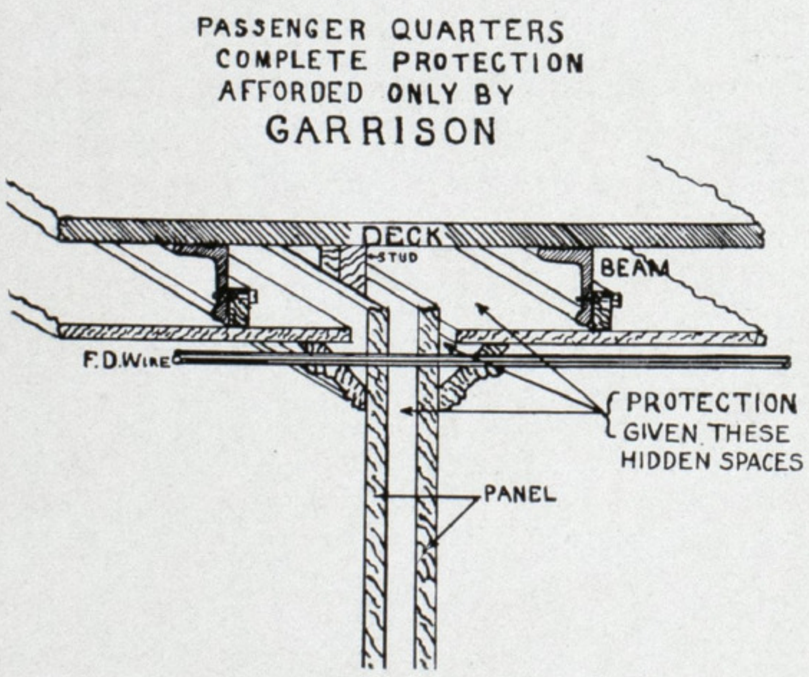
CARROLL S. SMITH

BUILDERS—

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

CONTROL PANEL

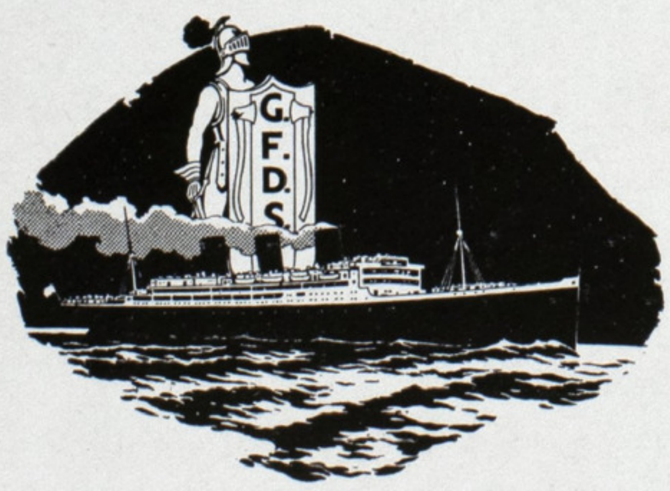
Note the graphic arrangement of zone indications and the individual circuit cut-off buttons.



Garrison may be installed and maintained by a first class electrician. It is not tricky, — there are no pressures to maintain, no valve to adjust—there is no moisture condensation and therefore no drain valves involved—there are no fragile glass parts—there are no open contacts to corrode—there are no delicate galvanometers—and there is no question or doubt as to whether the thermostat is in circuit or not.

Garrison is the only approved system that has double battery supervision, individual circuit cut-off buttons, and a thermostat that is —

waterproof	continuous
corrosive-proof	electrically supervised



GARRISON FIRE DETECTING SYSTEM Inc.

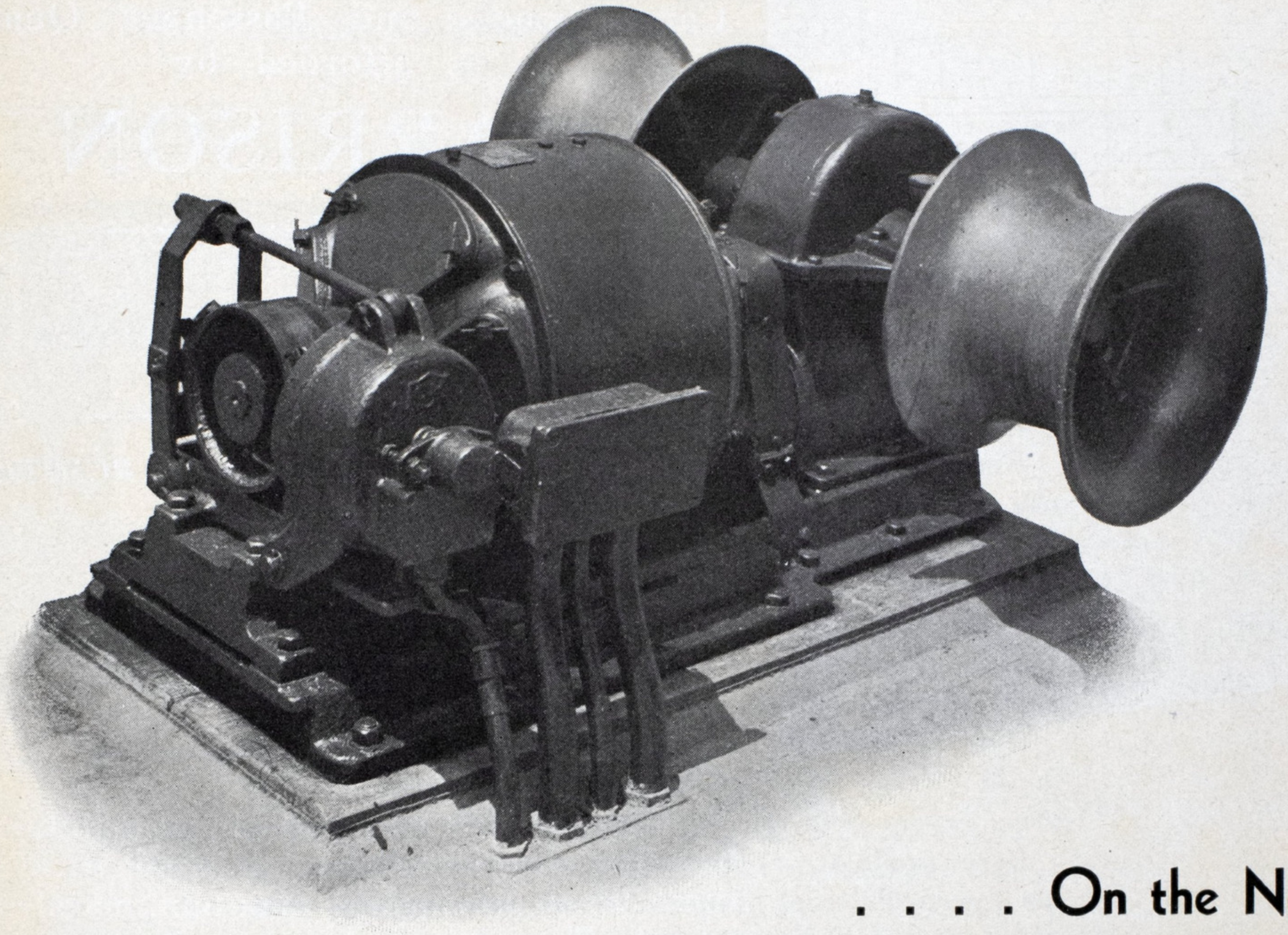
NEW YORK CITY
307 Fifth Ave.

BALTIMORE, MD.
904 American Building

Approved by Steamboat Inspection Service.

Vol. 61, No. 6, June, 1931, issue of MARINE REVIEW, published month ly at Cleveland, O. Entered as second class matter at the post office, Cleveland, Ohio, under the act of March 3, 1879. Subscription price $3. 00 a year in U. S.; Canada, $4.00; Great Britain, £1; single copies, 35c

Here's the BOAT WINCH MOTOR - - -



DIEHL Watertight Marine Motor driving American Engineering Co., Boat Winch. Cutler-Hammer Watertight Brake and Control.

. . . . On the New P. and O. Steamer FLORIDA

This is but one of many Diehl motors installed on this modern passenger steamer recently completed by the Newport News Shipbuilding and Dry Dock Company, Newport News, Va.

The installation also includes more than 300 Diehl electric stateroom fans, equipped with Monel Metal guards and blades, a unique feature which completely resists the corrosive action of marine atmospheres.

Modern transportation demands modern equipment. The selection of Diehl motors and fans by a number of American shipbuilders and operators is a testimonial to their fitness for present day marine requirements.

DIEHL MANUFACTURING COMPANY

Electrical Division of

THE SINGER MANUFACTURING CO.

ELIZABETHPORT, N. J.

Atlanta—Boston—Chicago—New York—Philadelphia

DIEHL

Your engine may not fall apart

Breakdowns happen, of course. But you seldom have really serious engine trouble at sea. The likelihood of an actual breakdown is small. Modern engines will stand a lot.

You could even lubricate with fuel oil—for a while. You can use ordinary oil—and your engine will still be good.

Yes, but how good? What's the price of low-grade lubricants?

Marine experts agree that a great deal of all engine trouble and maintenance expense could easily be avoided—is due directly to the use of unsuitable oils.

Gargoyle Marine Oils lengthen engine life through reduced friction. Wear and tear is kept at a minimum. 65 years' experience in scientific lubrication is your protection.

Every grade of Gargoyle Marine Oil is specially refined for a particular type of service. That's why you get lower fuel and oil consumption as well.

Stocks of Gargoyle Marine Oils are readily available in more than 300 of the world's leading ports. Why not go into this idea of practical engine-room economy thoroughly with one of our representatives when he comes aboard?

We shall be glad to send you either of these valuable books without any obligation: "*Steamships with Reciprocating Engines*," "*Marine Lubrication—Motorships*." Address Vacuum Oil Company, Marine Sales Department D-6, 61 Broadway, New York City.

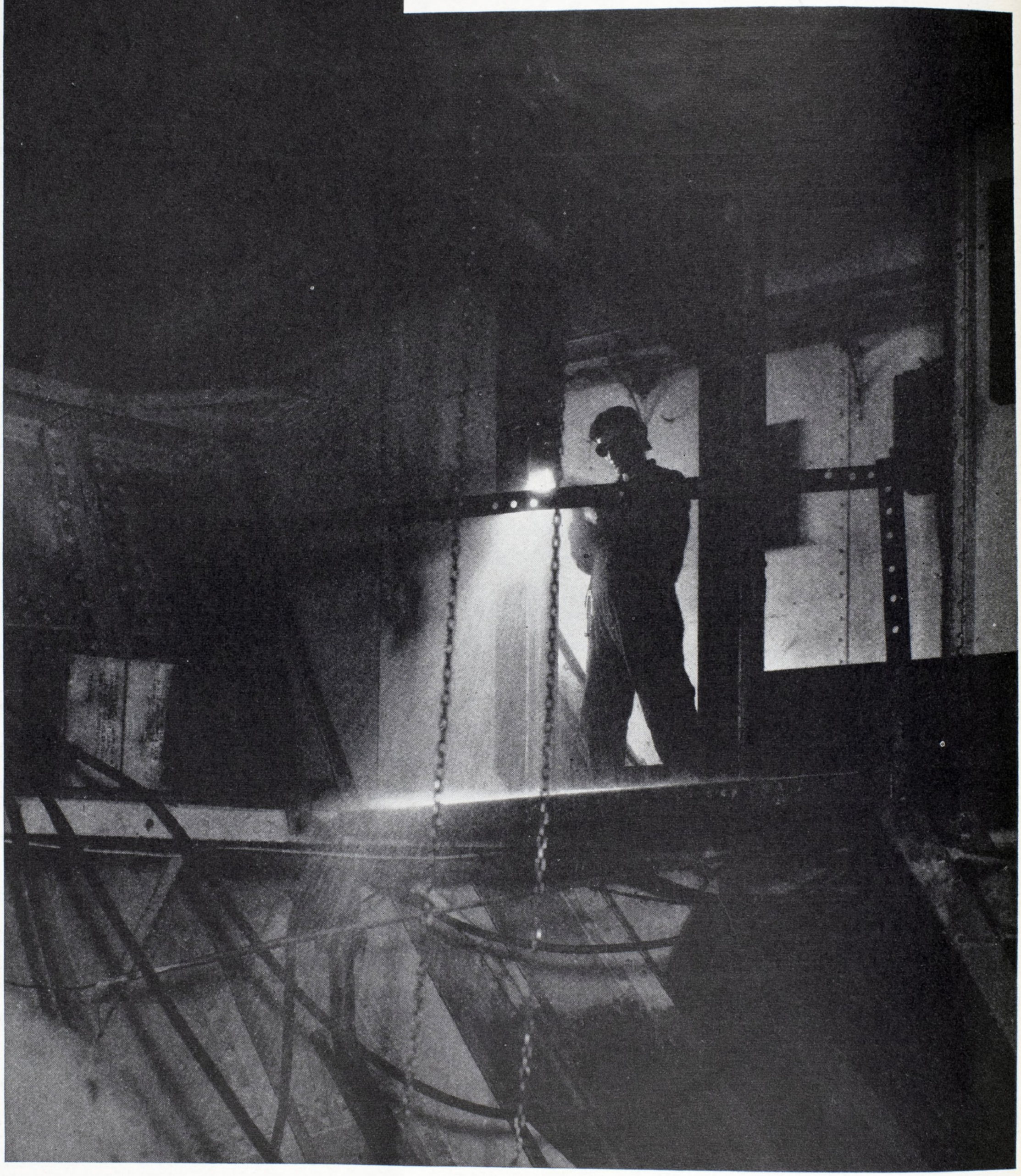
GARGOYLE

Marine Oils

A grade for each type of service

VACUUM OIL COMPANY

WHY *do we*



The AMERICAN

CLEVELAND
American Ship Building Co.

LORAIN
American Ship Building Co.

BUFFALO
Buffalo Dry Dock Company

suggest SHIP REPAIRS *or* ALTERATIONS *in* June?

• *Some companies have been letting this work slide—"until shipping picks up." Then it will be too late.*

MANY boats on the Great Lakes *need* repairs of some kind now—new tanktops, boilers overhauled, or smaller jobs done.

Most ship operators also have in the back of their minds certain alterations which will increase the efficiency of their vessels and add to their earning power.

Now is a good time to have such repairs and alterations made. While this message is being written, a number of ships are still in their winter berths.

Why isn't it a splendid opportunity to make repairs and alterations? Materials are low in cost, labor is efficient.

It's not only common sense, but it's actually thrifty to have American Ship begin on your work *now*, so your ships will be ready when you need them most. Five convenient ship yards completely equipped to build, alter or repair ships dependably, are ready to serve you on any size job—now!

SHIP BUILDING Co

SOUTH CHICAGO
Chicago Ship Building Co.

SUPERIOR
Superior Shipbuilding Co.

GOVERNMENT AID ALONE IS NOT SUFFICIENT

The hope we now have in American ship undertakings and the faith we possess in the vision of an American fleet proportionate to the American cargoes to be carried over the seven seas and adequate for naval auxiliaries in time of war, will only be realized when the American people take a vital interest in things pertaining to shipping and support it by their patronage.

TOO many of our people transport their goods and travel on foreign vessels. Every American, no matter what his station in life may be, ought to use American ships when they are available. Such patronage would tend to increase the number of new ships built in the United States and every new ship built here adds to the strength of our Merchant Marine.

Shipping Must Have the Wholehearted Support of the Nation

NEW YORK SHIPBUILDING COMPANY

Main Office and Works:
CAMDEN, N. J.

New York Office:
420 LEXINGTON AVE.

THE GENERATING SETS MUST BE GOOD, TOO!

The Oil Tanker *Brilliant*, Owned by The Standard Oil Company of New York, and Built by The Sun Shipbuilding Corporation, Is Equipped With Two Cooper-Bessemer 75 K. W. Diesel Engine Generating Sets.

THE power problem is not solved with the selection of the main engines. Every architect, builder and engineer knows that smooth operation demands good auxiliary generating sets, too.

Cooper-Bessemer performance standards for main engines also apply to the diesel engines driving the electric generators. You can depend on them for smooth, steady operation. And what is important for comfort is the absence of vibration.

Many of the newest tankers, cargo boats, ferries, tugs and fishing boats have good engine performance assured with their Cooper-Bessemer diesel engines.

THE COOPER-BESSEMER CORPORATION

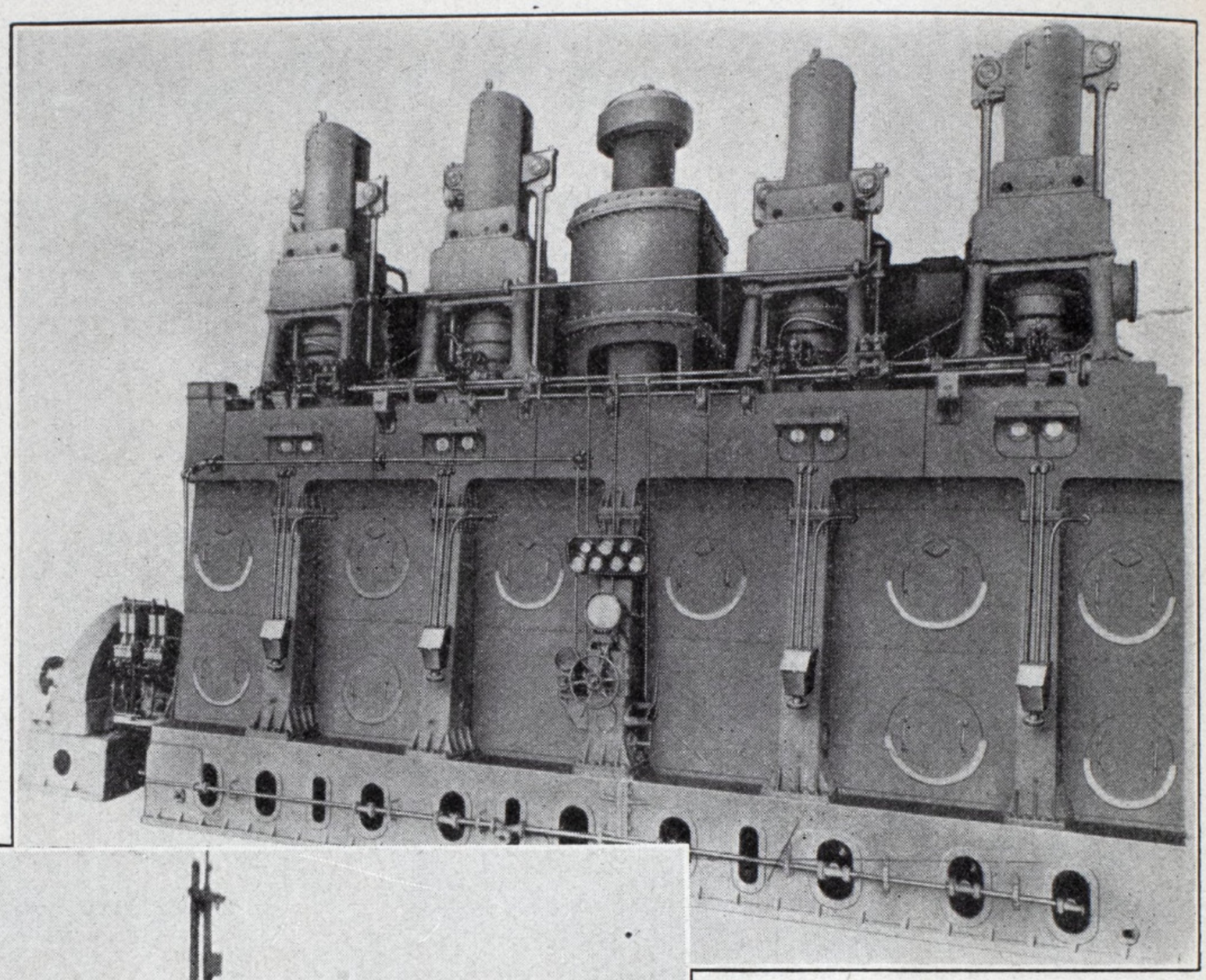
GENERAL DIESEL SALES OFFICES: SUITE 301, 25 W. 43rd STREET, NEW YORK CITY

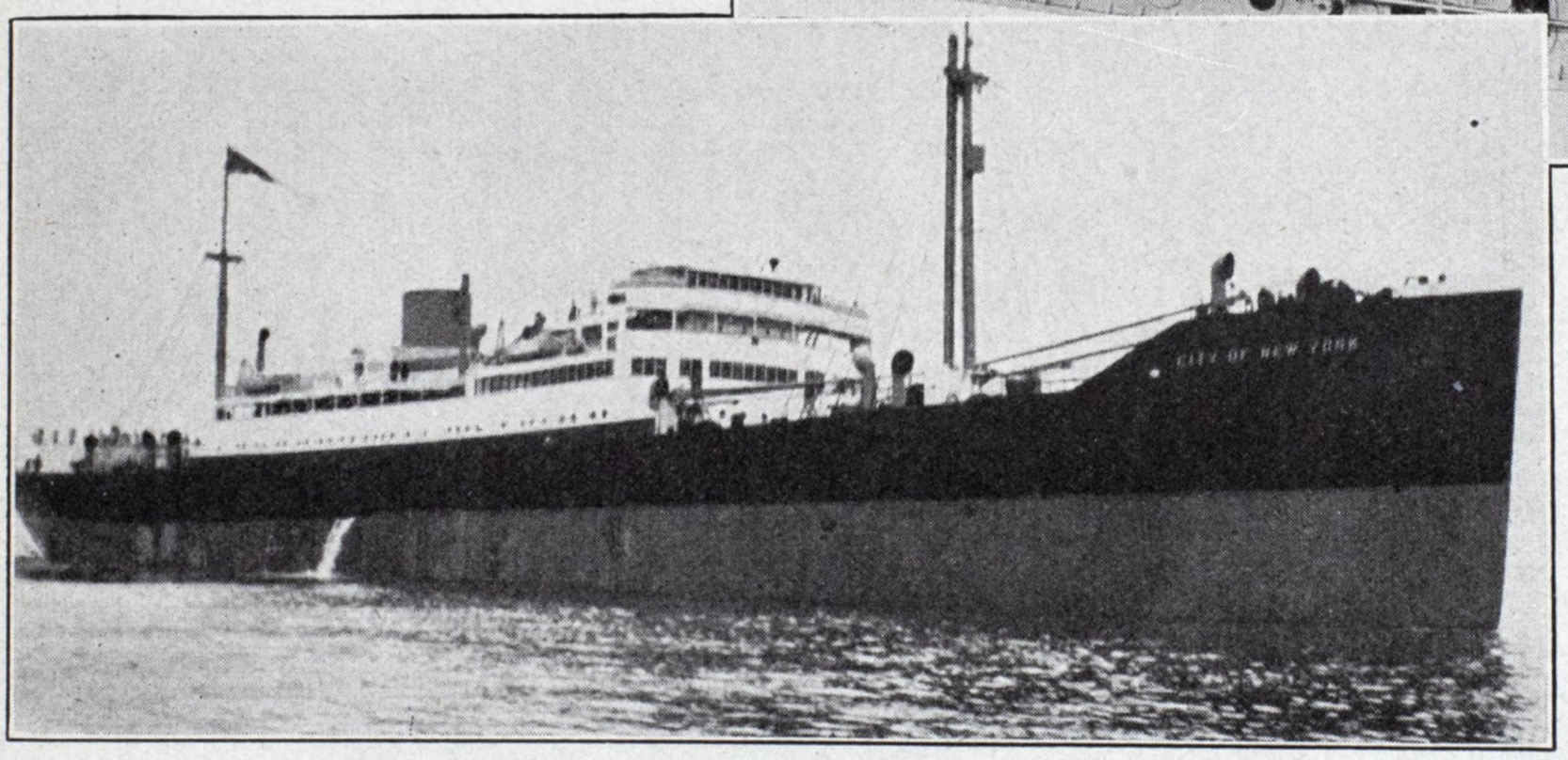
131 State Street, *Boston, Mass.* 505 Esperson Building, *Houston, Texas* 640 East 61st Street, *Los Angeles, California*
Hoffar's Lt'd., *Vancouver, B. C.* The Pacific Marine Supply Co., *Seattle, Washington*
PLANTS: MOUNT VERNON, OHIO GROVE CITY, PENNSYLVANIA

COOPER-BESSEMER

Power with Efficiency

SUN-DOXFORD Opposed-Piston DIESEL ENGINES





Many American Vessels are now equipped with American Built Sun-Doxford Diesel Engines built in the Sun Plant.

Builders of

Passenger and Cargo Vessels—Oil Tankers

Unlimited facilities for

MARINE REPAIRS

Two floating Dry Docks
11,000 Tons Lifting Capacity Each

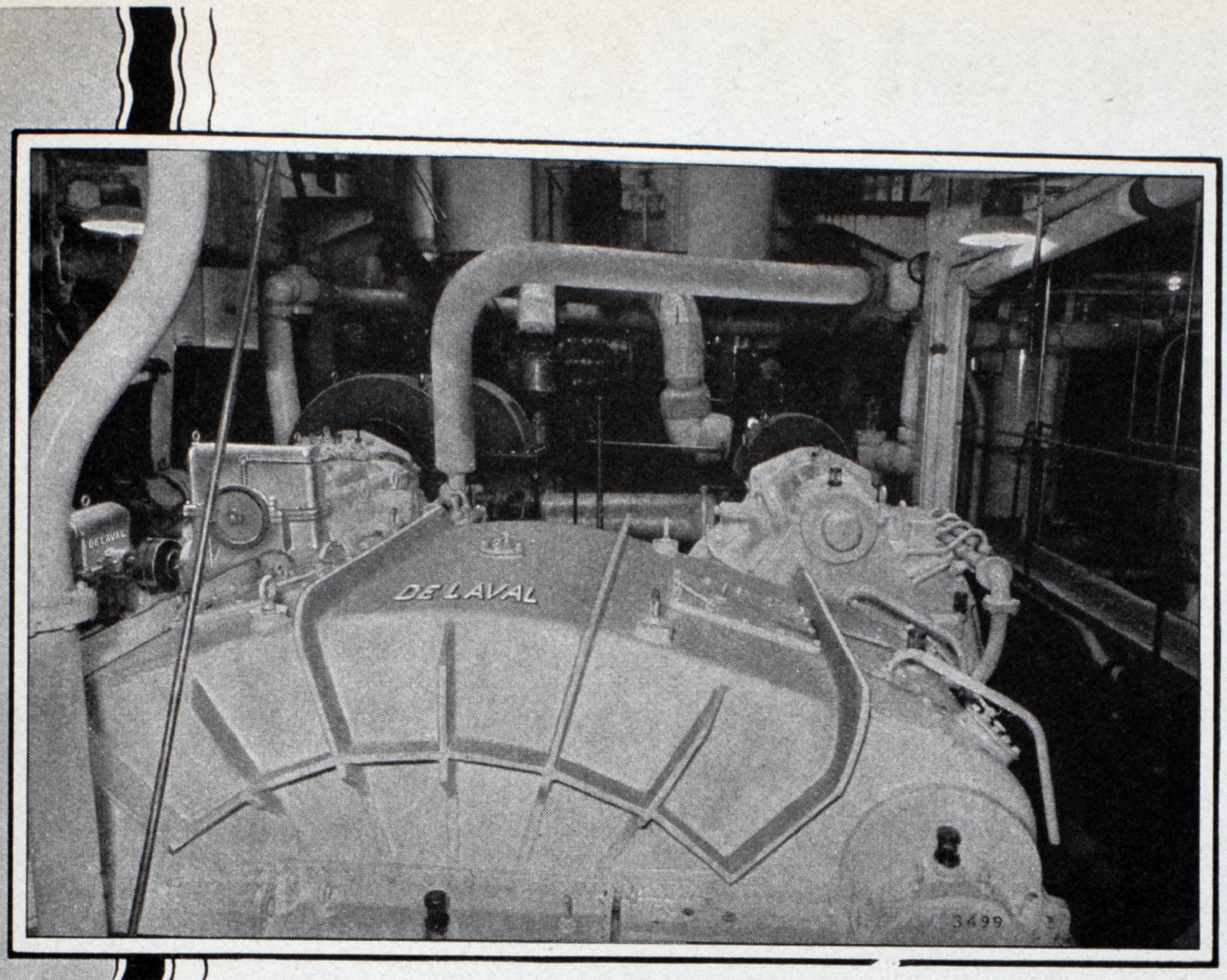
DRYDOCKING AND REPAIRS

BUILDERS OF ALL TYPES OF VESSELS

SUN SHIPBUILDING & DRY DOCK COMPANY

Shipyard & Main Office
CHESTER, PA.

25 Broadway
NEW YORK



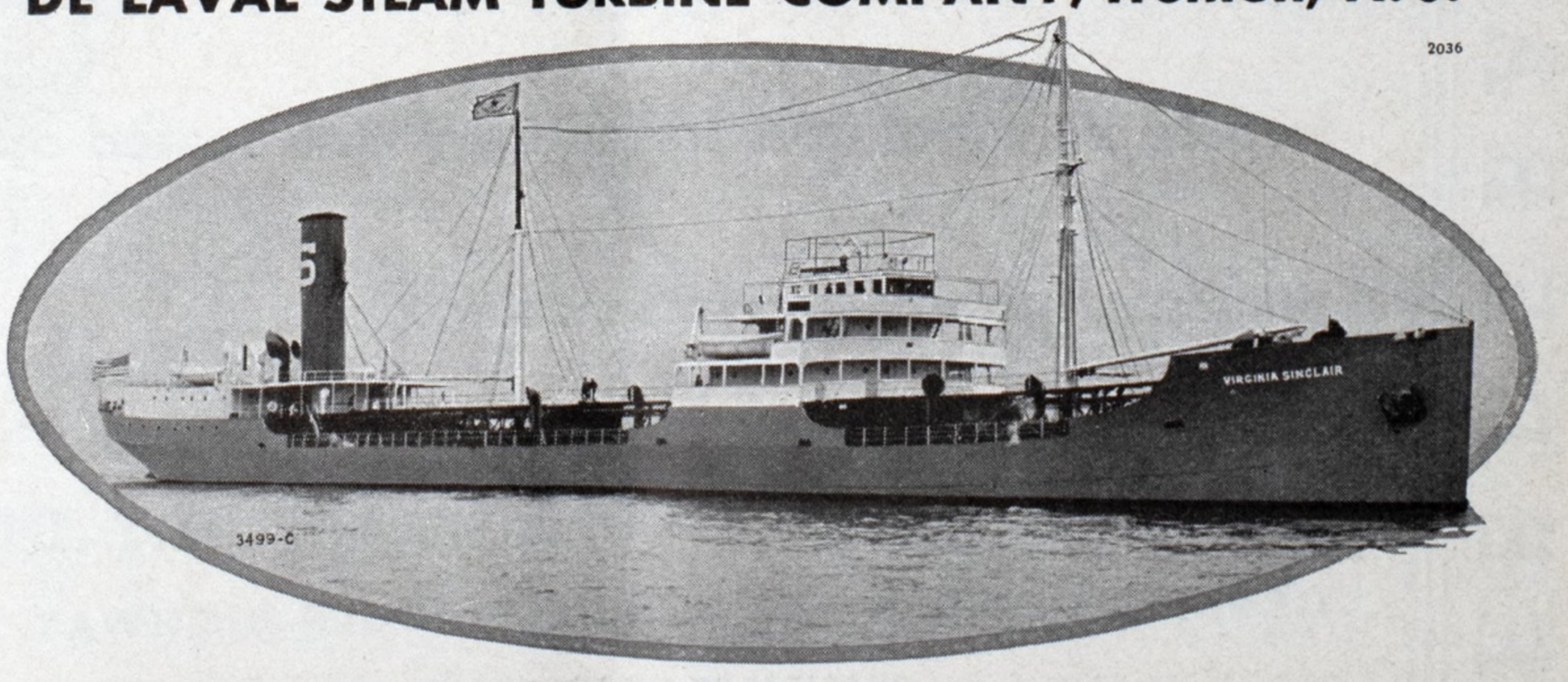
DE LAVAL GEARED TURBINE
Gives Higher Speed at Less Cost

PROPELLED by a De Laval double geared, compound turbine and operating on steam at 400 lbs. gage, with 200 deg.F. superheat, the ocean-going bulk oil tanker "VIRGINIA SINCLAIR" makes the trip between Houston and Marcus Hook in a little over 5 days, as compared with the 7 or 8 days required by older tankers. This vessel and the "HARRY F. SINCLAIR, Jr.," both operated by the Sinclair Navigation Company, are among the fastest tankers afloat. When making an average speed of 12½ to 13 knots, the consumption of bunker oil is only 160 bbl. per day.

The "VIRGINIA SINCLAIR" is of 9275 tons dead weight, 435 ft. long, 57 ft. beam and 24 ft. draft. Electric auxiliaries receive current from two 60 kw. De Laval turbine driven generators and the boilers are supplied by a De Laval turbine driven centrifugal boiler feed pump.

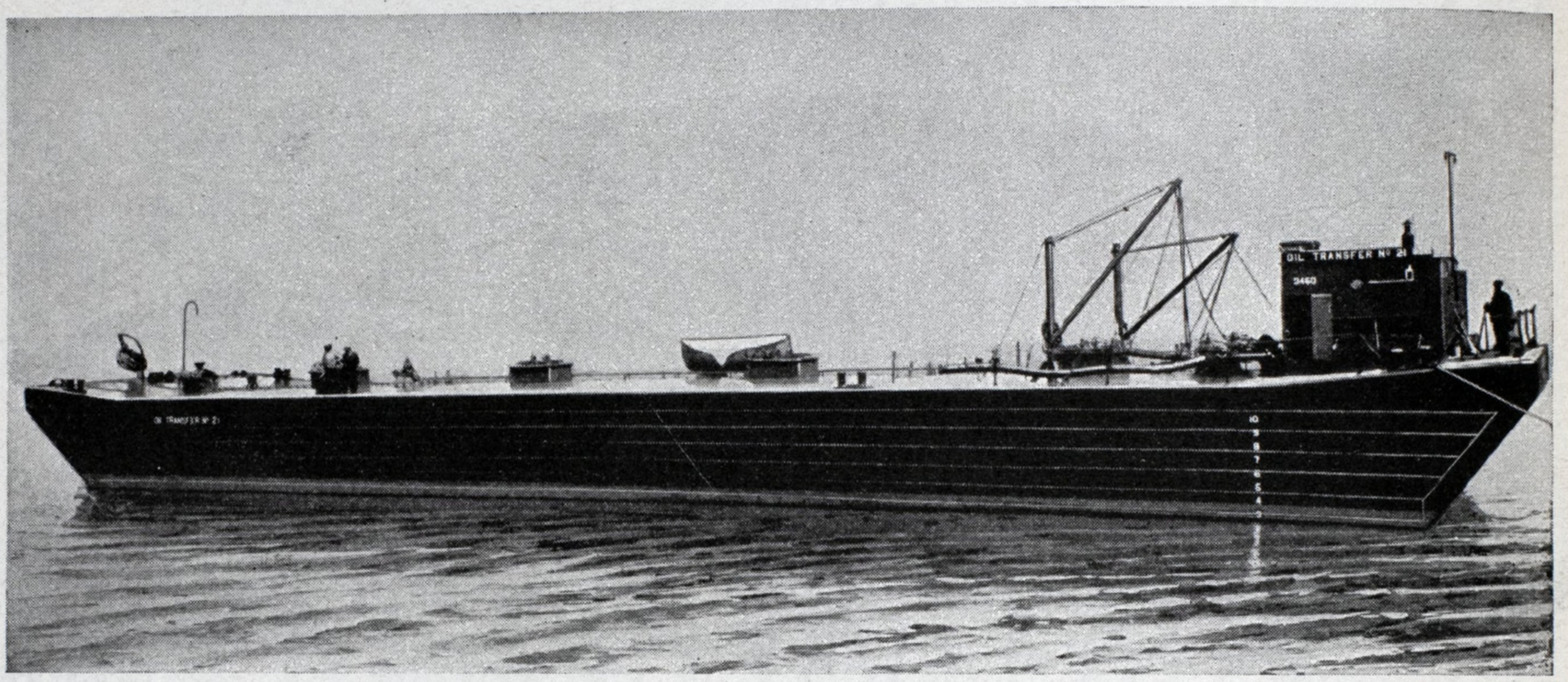
DE LAVAL STEAM TURBINE COMPANY, Trenton, N. J.

2036



FEDERAL BUILDS GOOD BARGES

ANOTHER ELECTRICALLY WELDED OIL BARGE ENTERS SERVICE



View of the 10,000 bbl. welded oil barge of the Oil Transfer Co. of New York, recently completed by the Federal Shipbuilding and Dry Dock Co. This is the FOURTH welded barge of Federal design built for this Oil Company. All have been in continuous service, the first since April, 1929.

Welded barges of Federal design have given satisfaction in operation, and demonstrated their superiority over the riveted type. No rivets to become loosened through damage or affected by corrosion... tight joints obtained without caulking or packing...welding performed by automatic machinery and tested operators,

resulting in uniform workmanship.

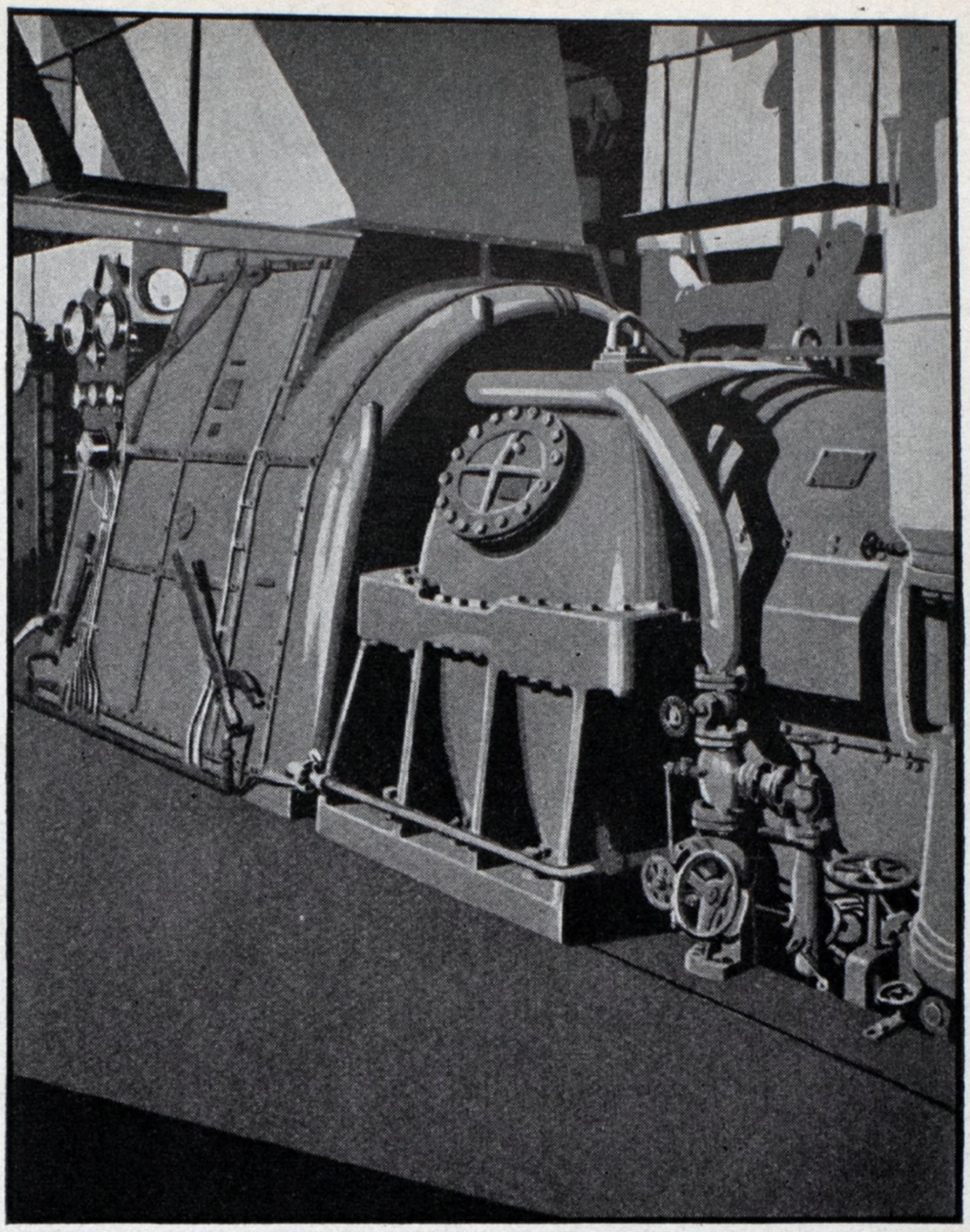
US STEEL

FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

GENERAL OFFICES AND WORKS: LINCOLN HIGHWAY, KEARNY, NEW JERSEY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

THE ELECTRIC ENGINE ROOM



OPERATING instruments compactly grouped on a central switchboard—spotless floor and bulkheads—silence save for the subdued hum of the turbine-generator—a new deep-sea chantey that sings of speed without vibration, energy without effort, economy without stint.

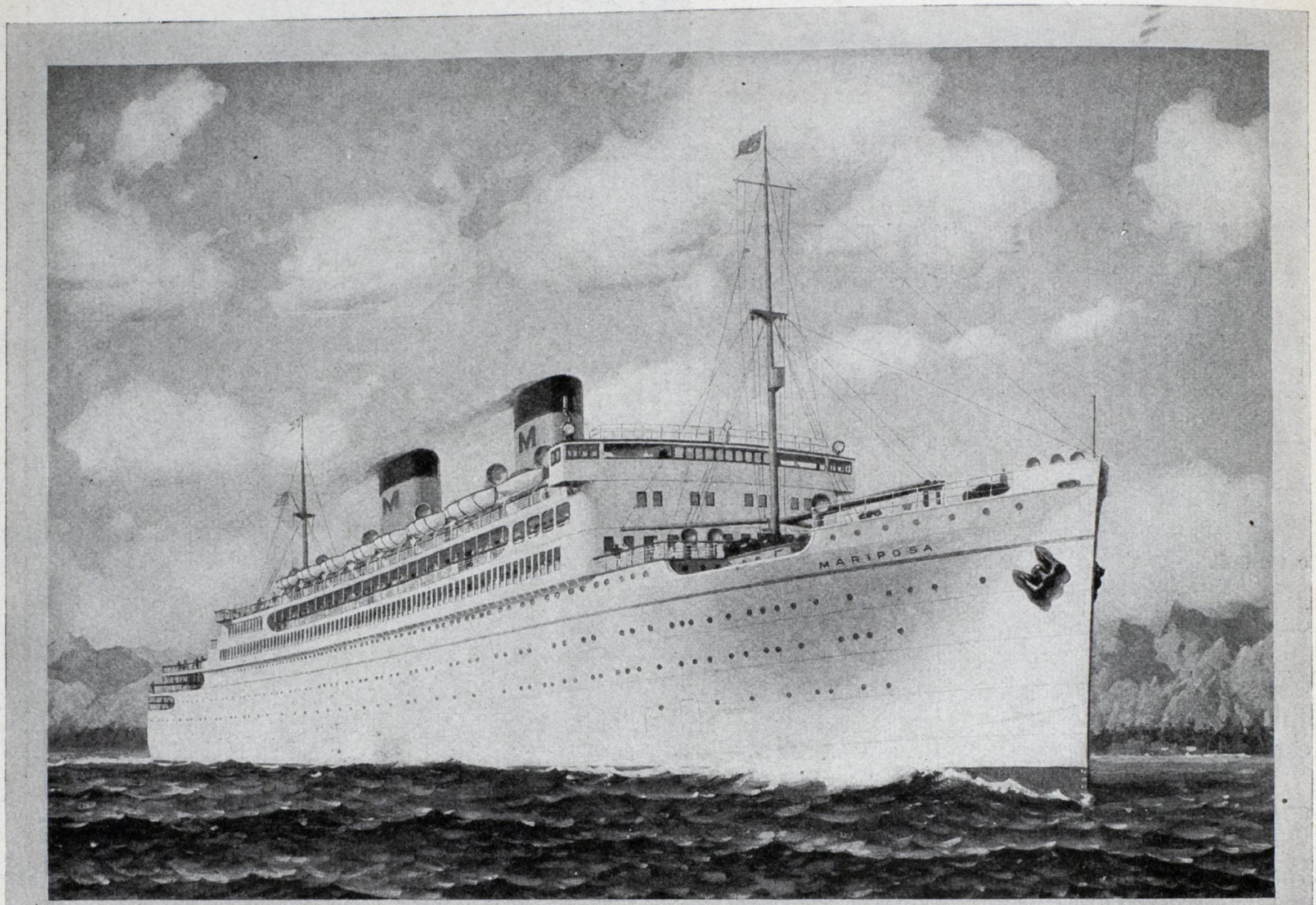
That is the engine room of an all-electric ship. • It symbolizes the trend of ocean travel—the comfort that must, nowadays, be carried to sea—the enjoyment that makes the voyage an object in itself. • It is also a recognition by forward-looking lines of the commercial advantages that attend modernization—the investment value of electric propulsion; its appeal to fastidious travelers; its speed and reliability; the completeness and dependable operation of ships' auxiliaries. • General Electric marine engineers speak with the certitude born of comprehensive experience in the equipment of all-electric ships. Whether your preference is for turbine-electric, turbine-gear, or Diesel-electric drive, they can prove to you the sound business policy of meeting modern demands with modern methods of propulsion.

GENERAL ELECTRIC
MARINE EQUIPMENT

JOIN US IN THE GENERAL ELECTRIC PROGRAM,
BROADCAST EVERY SATURDAY EVENING ON A
NATION-WIDE N.B.C. NETWORK

173-18

ONE OF 3 NEW MATSON LINERS



S. S. Mariposa

UNDER CONSTRUCTION AT FORE RIVER

The SS "Mariposa" is one of three luxuriously equipped steamers now under construction at the Bethlehem Fore River Plant, Quincy, Mass., for the Oceanic Steamship Company (Matson Line) . . . These vessels are intended for trans-Pacific service between San Francisco, Honolulu and Sidney and have accommodations for 706 passengers. They will be powered by Bethlehem Turbines, driving twin screws through single-reduction gears, to develop a trial speed of 20½ knots . . . The "Mariposa" and sister-ships, the "Monterey" and "Lurline", will be noteworthy additions to a fleet which already includes a number of Bethlehem-built vessels.

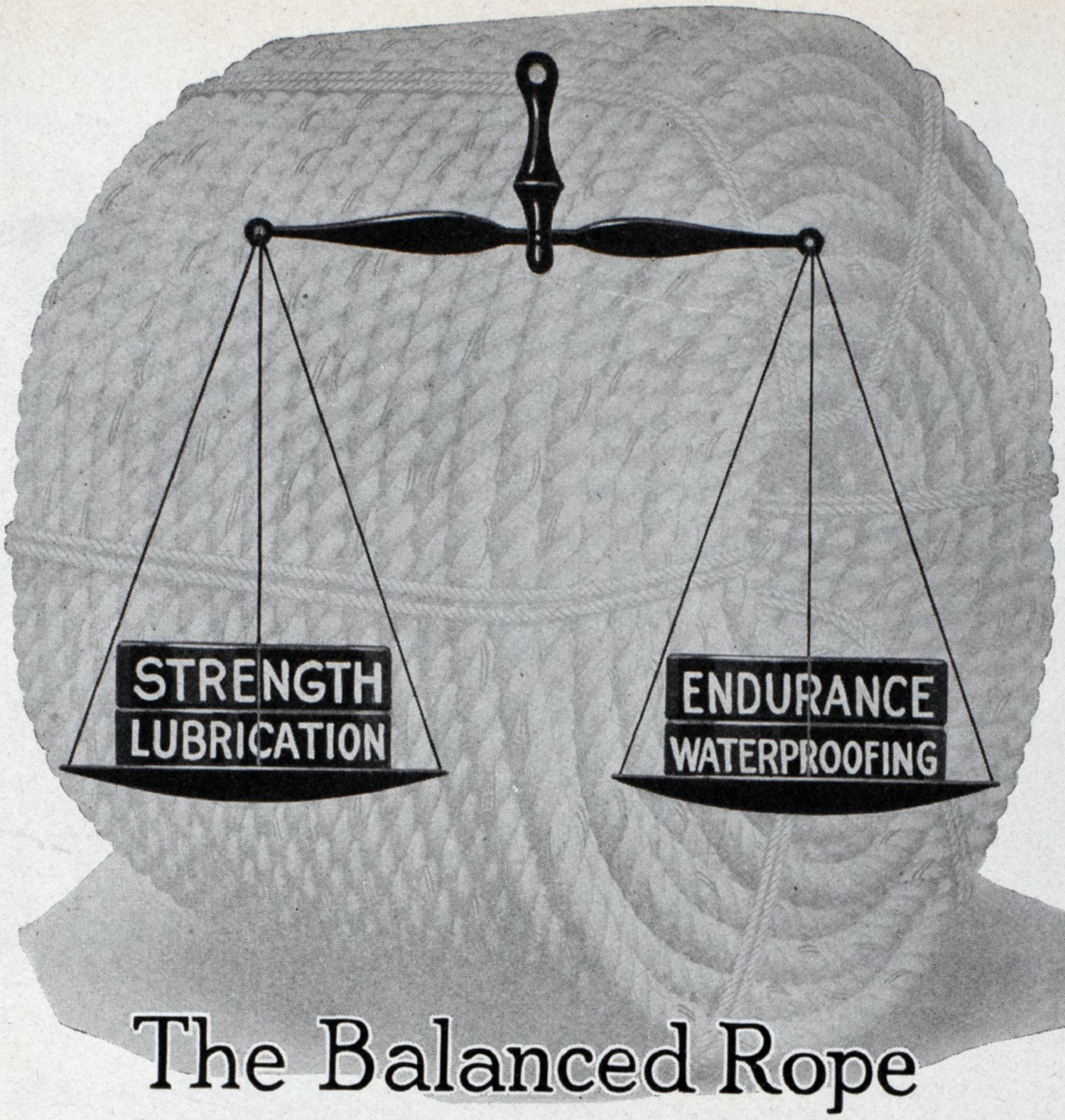
The general particulars of these vessels are: Len. O.A.—632′ . .Br. Mld.—79′ . .Draft-–28′ . .Disp.—25,885 tons . .Gr. Tonnage—22,000 tons

BETHLEHEM SHIPBUILDING CORPORATION, LTD., BETHLEHEM, PA.

General Sales Offices: 25 Broadway, New York City and 20th and Illinois Sts., San Francisco

District Offices in Boston, Baltimore, and San Pedro

BETHLEHEM



The Balanced Rope

Take aboard a balanced rope — the only rope that will always give the proper service.

A balanced rope is one in which all its qualities are equalized, one counterbalancing another, so that maximum service will be derived under any condition.

Some ropes have great strength but wear out quickly. In Columbian, strength and endurance are so perfectly balanced that it possesses great strength as well as exceptional endurance. Scientific manufacture and correct grade of fibre make this possible.

In some ropes, lubrication is neglected to attain high waterproofing qualities and ropes insufficiently lubricated do not last long. Neither quality is emphasized in Columbian at the expense of the other. All Columbian is not only waterproofed but it is also thoroughly lubricated.

Buy the perfectly balanced Columbian *Tape-Marked* Rope. Its real value is appreciated aboard ship when good rope is needed.

Columbian Rope Company

332-90 Genesee Street

Auburn, "*The Cordage City*," N. Y.

Branches:— New York Chicago Boston New Orleans Philadelphia

COLUMBIAN TAPE-MARKED PURE MANILA ROPE

Great Lakes Hull under construction at our River Rouge Yard. From an etching by Vernon Howe Bailey.

HIGHEST STANDARDS

of workmanship, engineering and service are ever apparent in Great Lakes built ships and engines—and repairs.

GREAT LAKES ENGINEERING WORKS

Shipbuilders and Engineers

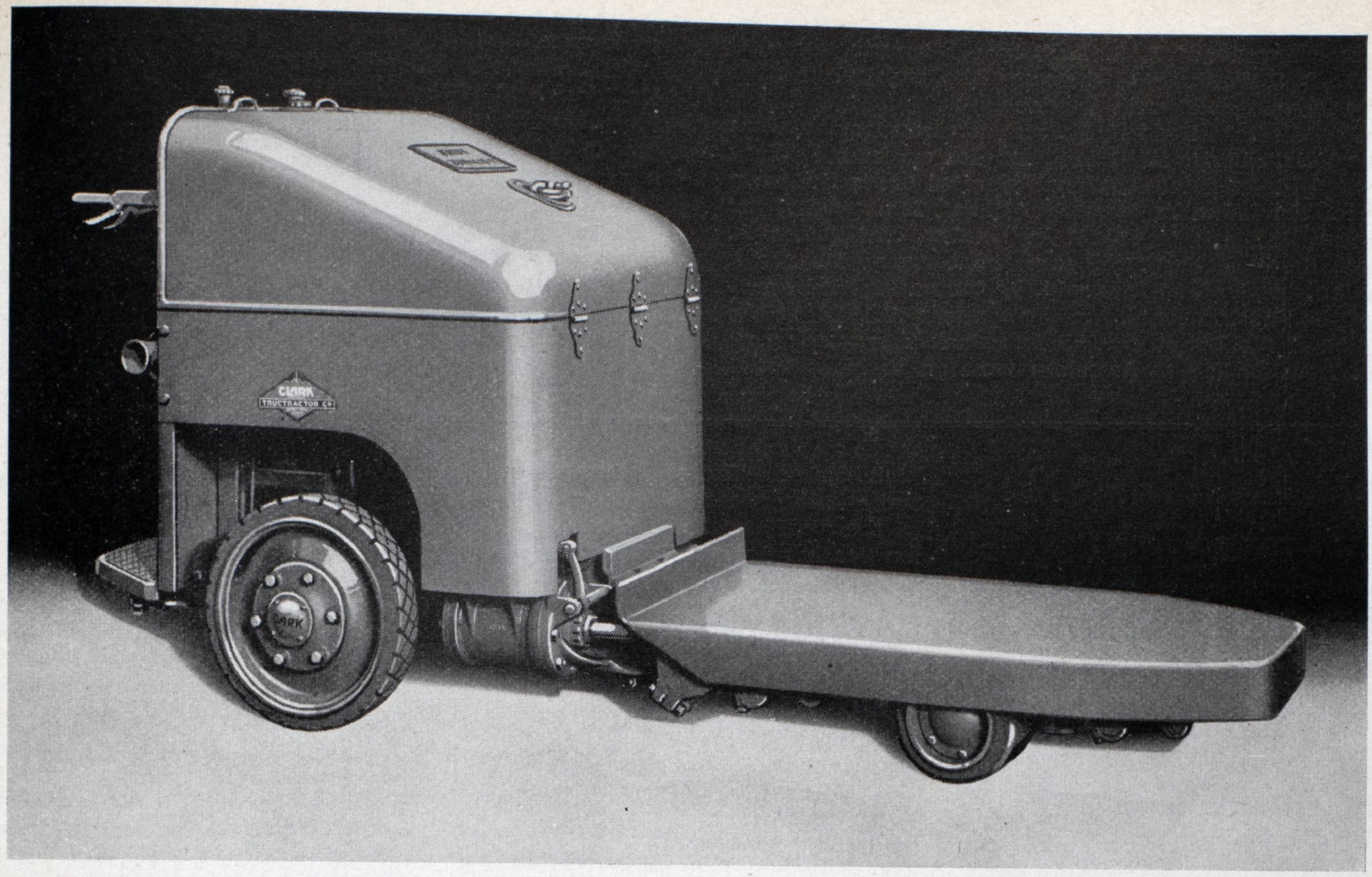
General Offices

River Rouge, Michigan

Cleveland Office: Union Trust Bldg.

Engine Works Equipped For General Heavy Machine and Foundry Work Detroit, Mich.

Complete Shipbuilding Dry Dock and Repair Facilities River Rouge, Mich., and Ashtabula, Ohio

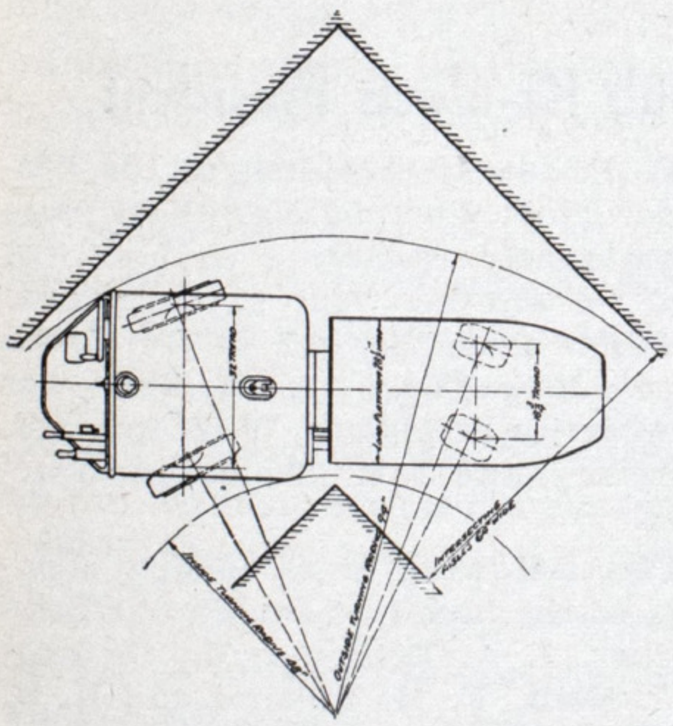


Negotiates side ports neatly, nimble in 'tween-deck space, powerful on the ramps.

CLARK TRUCLIFT

REG. U. S. PAT. OFFICE

Rear wheel drive! Four wheel steer! 94-in. turning radius!



With a 94-in. turning radius, Clark "Truclift" turns a corner of two intersecting 64-in. aisles with ample clearance on each side.

The new Clark "Truclift" brings to shipowners and stevedoring concerns a load-carrying capacity, a flexibility, a 24-hr. efficiency never before offered. The locomotive type cast steel frame insures stamina. The four cylinder tractor type gas engine supplies a constant flow of power—works 24 hrs. continuously and *just as potent the last hour as the first.* The powerful hydraulic hoist lifts 3 tons in 8 seconds.

Four wheel steer makes the truck agile on the most crowded wharf. Simple controls make operation simple. When the operator lifts his left foot, brake sets automatically. Machine without driver is dead.

Shipping profits are made or lost *in port.* Cut your cargo handling time and your pay trips multiply. Reduce your cargo handling costs and your profit margin widens.

Write for the new "Truclift" Bulletin—find out how the Clark "Truclift" shown here—or one of our 12 other models—can reduce the time your ship idles at the wharf.

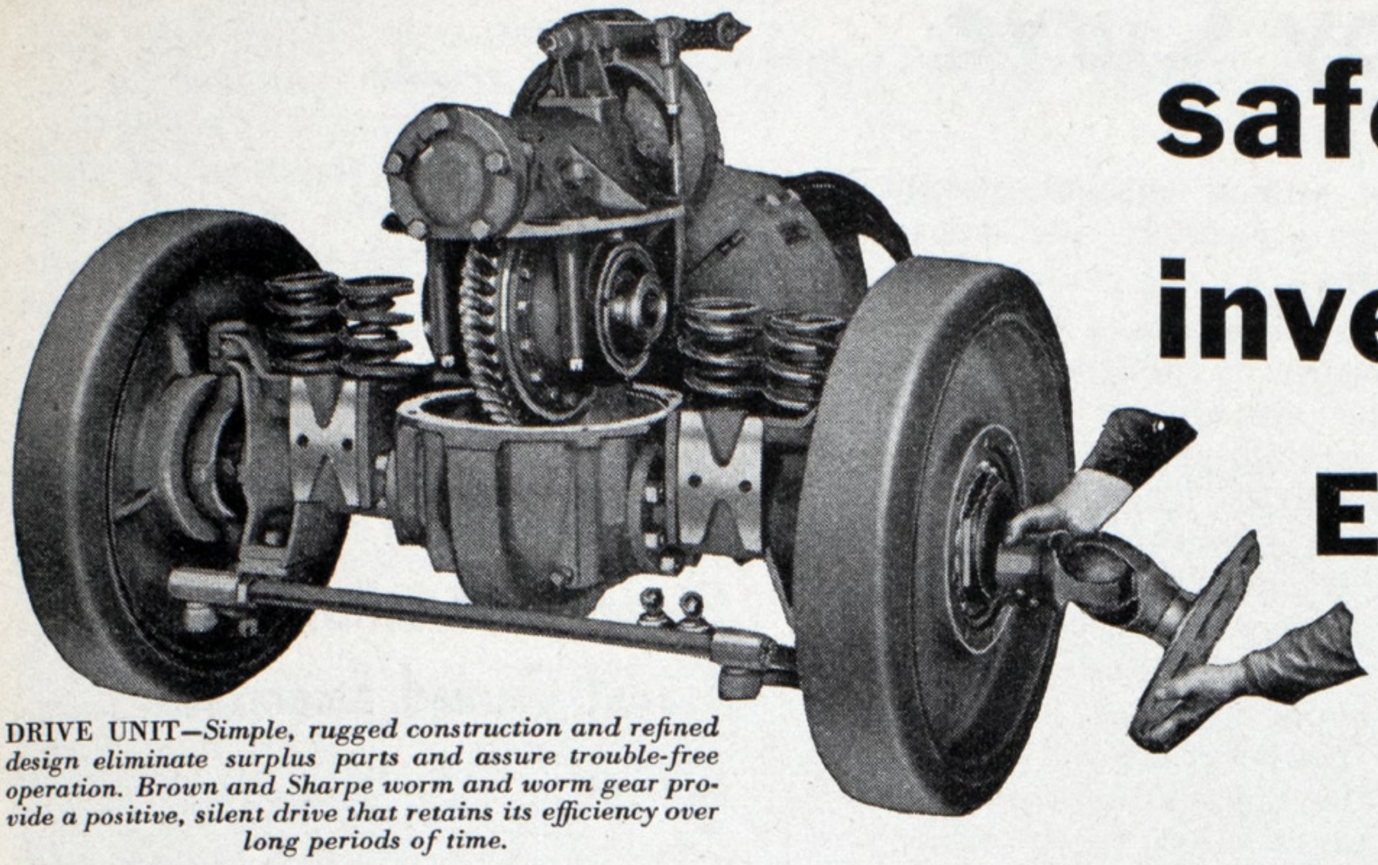
The Clark Tructractor Co.
Battle Creek, Mich.

Attach this ADVERTISEMENT to your inquiry

Speed cargo handling — A ship earns money at sea —not at the wharf

Precision WORKMANSHIP

safeguards your investment in an ELWELL-PARKER



DRIVE UNIT—*Simple, rugged construction and refined design eliminate surplus parts and assure trouble-free operation. Brown and Sharpe worm and worm gear provide a positive, silent drive that retains its efficiency over long periods of time.*

Parts machined and ground to one-half thousandth limit (.0005) are common in Elwell-Parker Electric Trucks. Drive knuckles, torque ball pins, and universal drive shaft ends are all held to these limits. Bearing seats on the differential cage, armature shafts and wheel knuckles are ground true within one-fifth thousandth limit (.0002).

Motors are tested from 20 to 25 hours in a series of periodic temperature tests as well as efficiency, load, and idle running tests, both before and after the assembly of the drive mechanism.

Chrome vanadium, chrome molybdenum, and nickle steels, multiple heat treated, are used for all parts where these special alloys will give greater strength and longer wear.

Rigid inspections, numerous tests and special machines assist in maintaining the extremely high standards to which all Elwell-Parkers are built. Inspections totaling hundreds are given to the various parts which make up the average Elwell-Parker truck.

High quality materials, skilled workmanship and rigid inspection safeguard your investment in Elwell-Parkers by assuring long life to every truck. Many Elwell-Parkers have seen twenty years of continuous service and are still in use. Elwell-Parkers help you increase your net profit, not only by making savings in handling jobs, but also through the low operating and maintenance costs of the trucks themselves.

Show your handling operations to an Elwell-Parker Field Engineer. Without obligation he will gladly submit drawings and specifications of the proper truck—engineered to your particular requirements.

Increase Profits by Handling on Skids. How would the system work on your docks? How much could you save? Where should you begin? You will find many facts to help you answer these questions in our new booklet, "Handling And Shipping on Skids." Complete in 16 pages. Contains 75 photographs. Sent on request. Write The Elwell-Parker Electric Company, 4200 St. Clair Avenue, Cleveland, Ohio.

ELWELL-PARKER

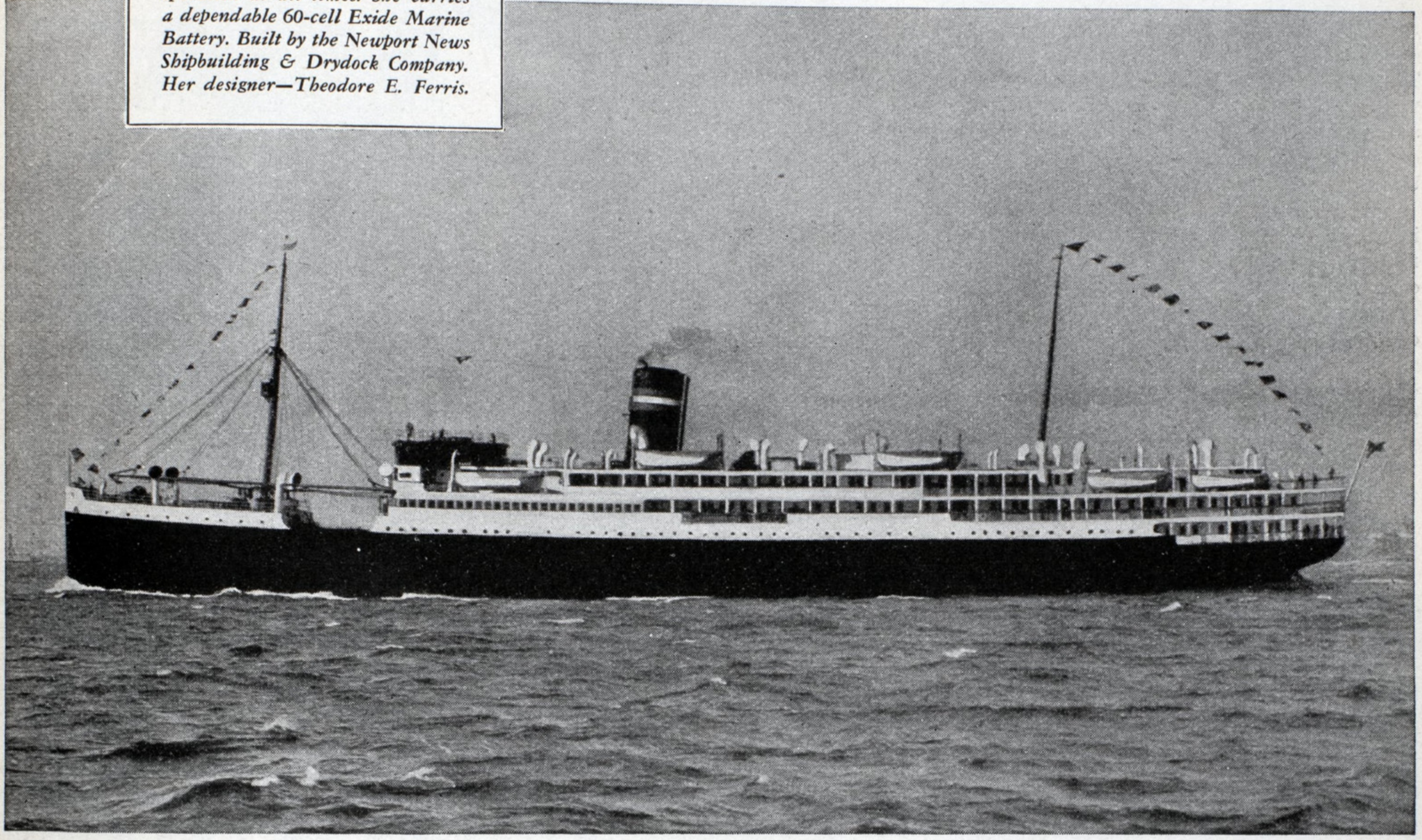
DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY

ARRIVE JUNE 15–6 AM –

flashes the message

from the SS COAMO=

PUERTO RICO BOUND. *Luxurious steamer* Coamo *of the Porto Rico Line makes certain of radio operation at all times. She carries a dependable 60-cell Exide Marine Battery. Built by the Newport News Shipbuilding & Drydock Company. Her designer—Theodore E. Ferris.*



AT THE San Juan office of the Porto Rico Line, time of arrival is noted and checked with schedule. Hours before she docks, radio tells of the on-time arrival of the *Coamo.*

Radio, the nerve-center of a ship, must not fail. It must forever be on watch, keeping in touch with her port, checking positions, receiving news, relaying messages, getting storm warnings. Power for its operation must be safeguarded.

Aboard the *Coamo* radio *is* safeguarded, with a dependable 60-cell Exide Marine Battery. It is on the job every second of the day and night to operate the emergency radio apparatus. Think of the importance of such a battery, should regular radio power fail.

Dependable Exides aboard mean safety for any ship. Not alone radio safety, but for lights, auxiliaries, pumps, bulkhead doors . . . there are Exides to take over the emergency operation of these important parts of equipment too.

Exide
MARINE
BATTERIES

Write for further information on Exides and Exide-Ironclad Batteries and their many varied applications in marine service. You will be interested in our new Bulletin—Form 3420. No obligation.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

A FULL-RIGGED SCHOONER IN A BOTTLE

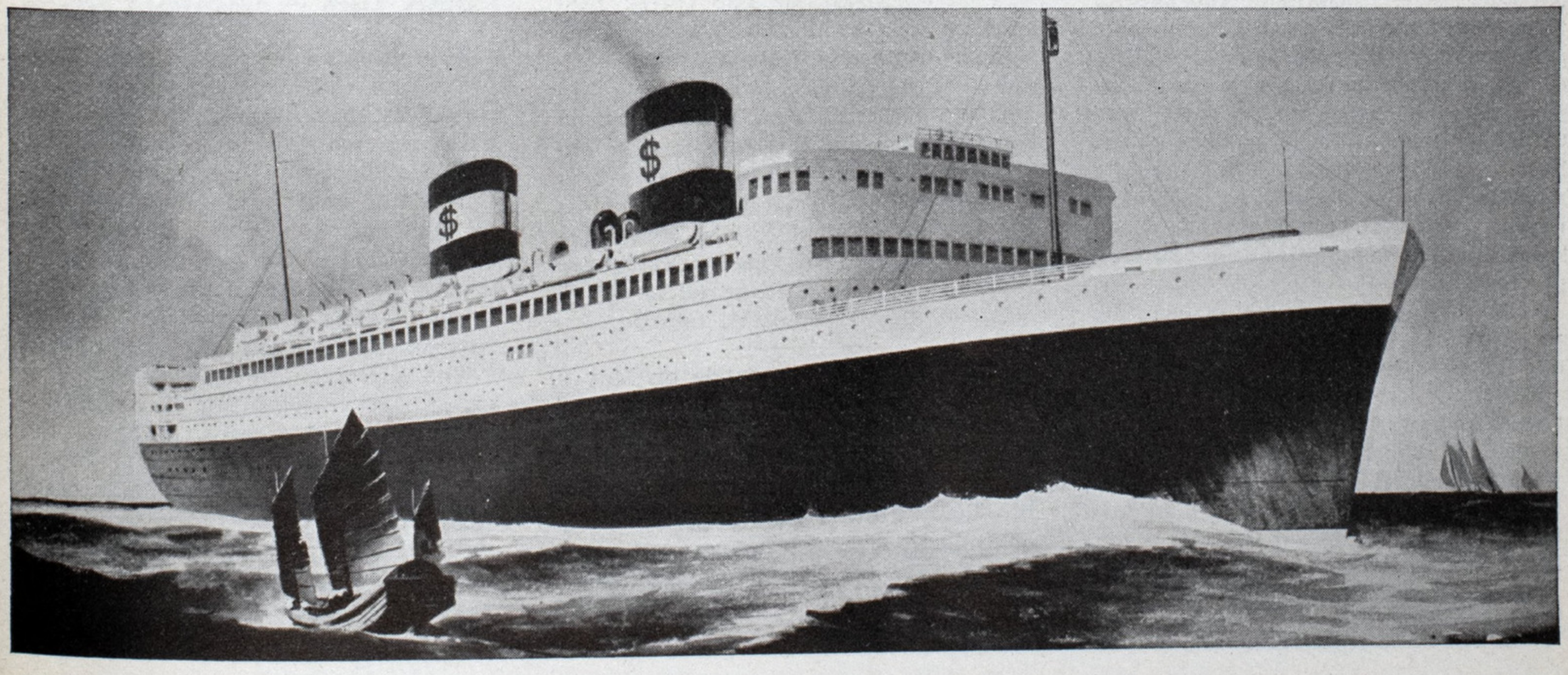
is more than Brunswick-Kroeschell has ever been called upon to do. But we have vied with "Shavings" in getting the Old Man's attention with a lot of efficient, seaworthy refrigeration in a small space. And it's always accessible, too. The space limitations and irregularities of refrigeration machine rooms are an old story with us. That's because we've been refrigerating ships on the seven seas for upwards of 30 years. Today, more than 3000 of them carry Brunswick-Kroeschell refrigeration. We'll be pleased to talk refrigeration for cargo holds, ship's stores and air conditioning with you any time you say. Brunswick-Kroeschell Company, a Division of Carrier Corporation, New Brunswick, New Jersey.

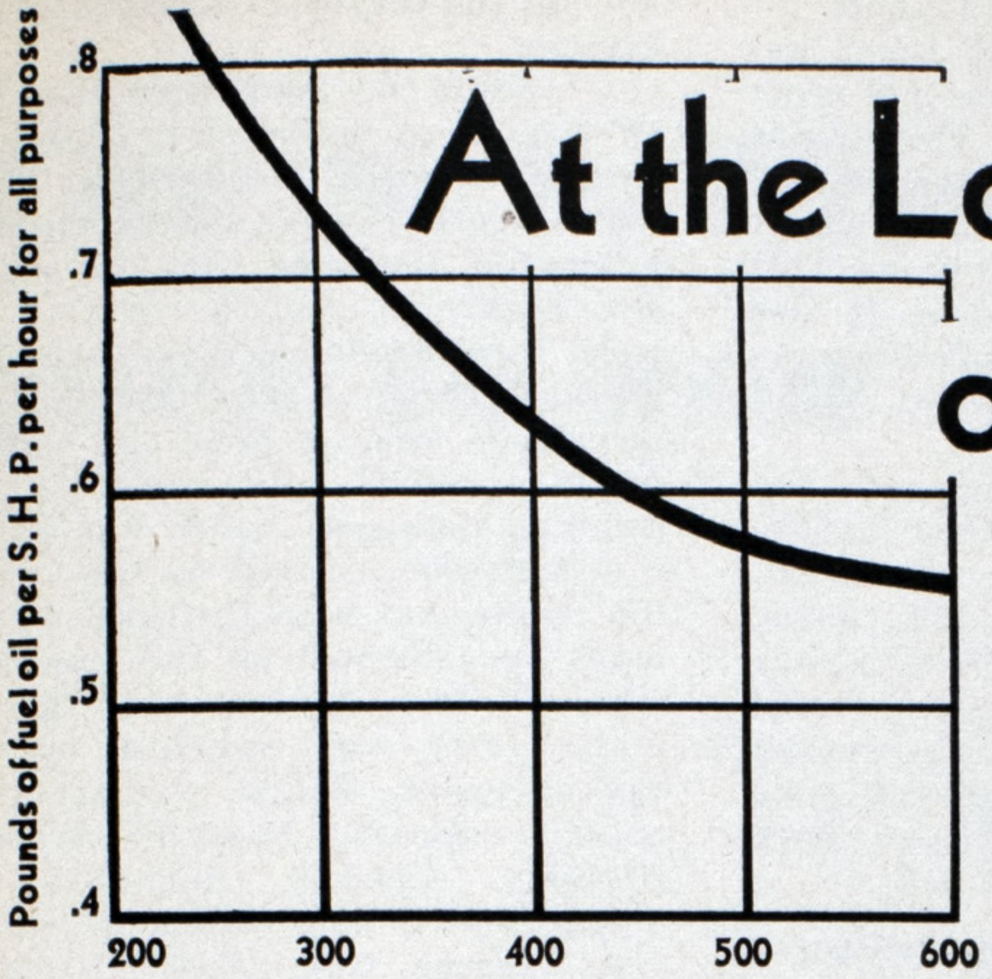
Carrier
Brunswick-Kroeschell
REFRIGERATION

★ ★ ★

For craft 100 foot or under, ask your architect or builder about the new B-K Junior model. We can stow it snugly on the tiniest cabin cruiser afloat!

S. S. PRESIDENT HOOVER, *of the Dollar Steamship Lines. One of more than 3000 American vessels carrying Brunswick-Kroeschell refrigeration. Designed and built by the Newport News Shipbuilding & Drydock Company.*





At the Low Cost End of the Curve . . . Modern Steam

THIS curve not only shows the approximate relation between steam pressure and fuel oil consumption but shows the savings possible through the use of Modern Steam.

Between the two ends of the curve . . . at about .65 pounds of fuel oil per shaft horsepower per hour . . . there is a condition easily met with Modern Steam even in a ship of small size, such as one of 2000 horsepower. This oil consumption combined with the low cost of boiler fuel represents the lowest cost of fuel per S. H. P. per hour of any propulsion system now in use. Steamships are now in operation using less than this amount of fuel while others under construction are guaranteed to equal or better this performance.

Ships using Modern Steam attain this economy with equipment of relatively low first cost, decidedly low repair and maintenance charges, of demonstrated reliability, and equipment that utilizes a wide variety of low priced fuels including Bunker C oil.

That the United States Marine Industry leads the world in clear thinking on this subject is shown by a recent report of the American Bureau of Shipping covering the principal horsepower built or contracted for in this country during last year. Of all the ships of 2000 horsepower or over, more than 89% of the total power is steam. The propulsion systems for ships of this size are selected not by guess but only after careful and thorough analyses of operating costs including fixed charges on machinery and fuel costs per shaft horsepower per hour for all purposes.

The upper and middle divisions of the curve were plotted from operating records of ships in service. The lowest oil consumption shown is based on the use of steam pressures and equipment similar to those in up-to-date stationary plants, and adapted to marine use.

Naturally a graph as simple as this one must be approximate, and of use only in a comparative way to show relative values since no account is taken of steam temperature or other variables which effect fuel consumption. The curve does show, however, the striking difference between Old Steam and Modern Steam as well as the possibilities for a further reduction in operating costs beyond those already realized aboard ship.

Modern Steam is not only showing the greatest true economy today but further economies are possible through the use of steam at pressures and temperatures higher than those adopted for marine service up to this time. No other propulsion system now in use holds such truly remarkable possibilities for further savings.

THE
BABCOCK & WILCOX
COMPANY

85 LIBERTY ST. NEW YORK, N. Y.

M-2

The S. S. Florida goes to sea

Another fine ship begins her career and Warren is proud that 28 Warren reciprocating and centrifugal pumps were chosen for her pumping equipment. Fifteen other liners of the new American Merchant Marine will also be Warren equipped. ★

★ S. S. President Hoover
S. S. President Coolidge
S. S. Excalibur
S. S. Exochorda
S. S. Exeter
S. S. Excambion
S. S. Monterey
S. S. Mariposa
S. S. Lurline
S. S. Talamanca
S. S. Segovia
S. S. Chiriqui
S. S. Antiqua
S. S. Quiriqua
S. S. Veraqua

WARREN STEAM PUMP COMPANY, Inc.
WARREN . . . . . MASSACHUSETTS

Warren Engineering Corp., Agent, 117 Liberty Street, New York City
M. L. Katzenstein, President

Western Engineering Company, Agent, 58 Main Street
San Francisco, California

4897

On S. S. FLORIDA--*over 50,000 Square Feet of* ASBESTOLITH *Decking*

Asbestolith is the ideal flooring for wood, steel, or cement decks. IT PRESERVES, PROTECTS AND INSULATES—IS SANITARY AND RESILIENT. Over 1000 vessels as reference—also 6000 buildings of all classes.

ASBESTOLITH MANUFACTURING COMPANY

Approved by American Bureau of Shipping

1 MADISON AVENUE, NEW YORK, N. Y.

Telephone Ashland 4-2140—2141

R. C. Burnside, Pres.

Established 34 years.

SHIPMATE
FUEL-OIL BURNING RANGES

are now available, properly designed to operate on 28 degree Baume oil.

The burner used in this connection embodies the principle of oil burning admitted generally to be the most scientific, namely, the mechanical atomization of the oil by centrifugal force.

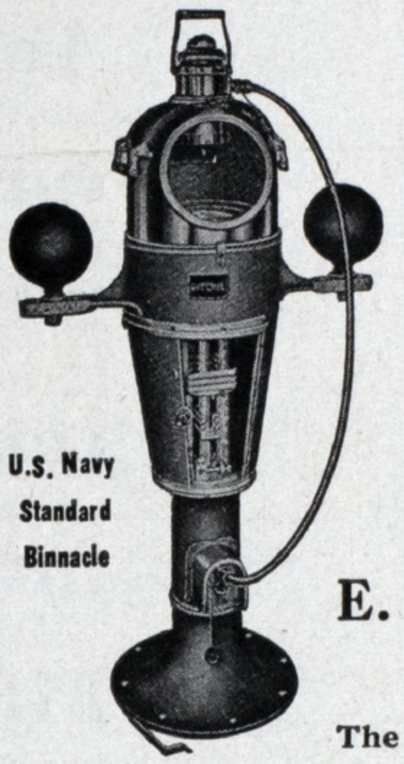
It is not an adaptation of a house heating or industrial burner; it is an oil burning appliance designed for the use to which it is put: cooking.

SHIPMATES are made only by

The Stamford Foundry Co.

Stamford, Conn.

Established 1830



THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.

Used Exclusively in U. S. Navy for over 40 years.

Over 65,000 on Merchant Vessels in all parts of the world.

Made in all sizes 2 to 12" dia.

Magnets for adjusting Purposes.

E. S. RITCHIE & SONS

Brookline, Mass., U. S. A.

Agents for the Great Lakes,
The Upson-Walton Company, Cleveland, Ohio

HAMBURG-AMERICAN LINE

PASSENGER SERVICES: New York to Cherbourg, Southampton and Hamburg. New York to Galway, Cobh (Queenstown), Cherbourg and Hamburg. North Pacific Ports to Hamburg, Bremen and Antwerp via Panama Canal.

PLEASURE CRUISES: Around the World, to the West Indies, to Northern Wonderlands.

FREIGHT SERVICES: New York to Hamburg (8 days). Boston, Philadelphia, Baltimore and Norfolk to Bremen and Hamburg.

North Pacific Ports direct to Hamburg, Bremen and Antwerp.

HAMBURG-AMERICAN LINE

39 Broadway New York

Baltimore City Office
310 E. Lombard St.
Plaza 1935

New York Office
No. 1 Broadway
Digby 2173

The Maryland Dry Dock Company
BALTIMORE, MD.

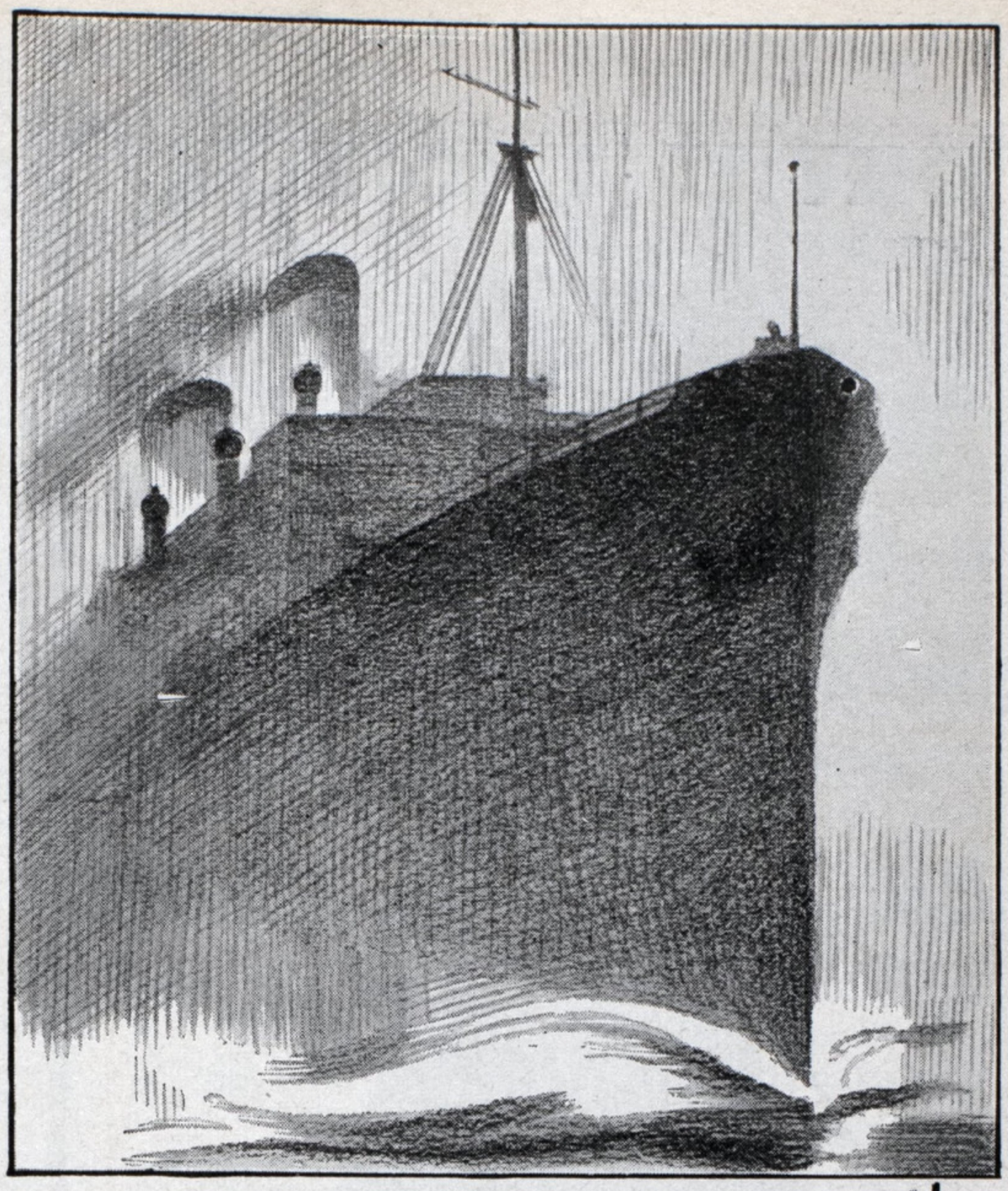
Drydocking, Shipbuilding and Ship Repairs of All Kinds

The Most Modern Shops in Baltimore 2—9000 Ton Floating Drydocks

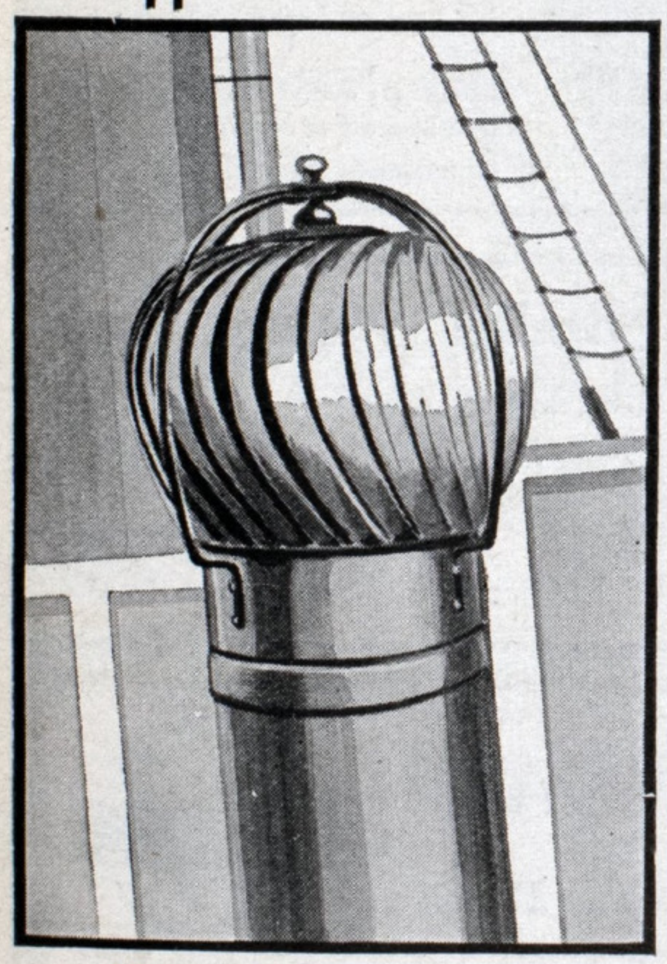
Floating Machine Shop

DAY and NIGHT SERVICE

Plant Phones: Curtis 0500 - 0501 - 0502 - 0503



ALWAYS TRIM — AND ALWAYS TRIMMED



Allen Turbine Ventilators add that new touch of efficiency and snappy appearance—so rapidly gaining favor on all craft from tugs to liners.

The tremendous capacity of Allen Turbine Ventilators assures thorough ventilation of staterooms or deepest holds.

Allen Turbine Ventilators are justly famed for their cost-free operation and life time service. Armco "Titecote" Galvanized Ingot Iron—or copper—assures utmost durability.

Whatever your ventilating problem, there is an Allen Ventilator—of the air Turbine, or motor driven type—that will fit your needs **exactly.**

Allen engineers offer you the benefit of their years of experience—entirely without charge. Call upon the most convenient representative for your needs.

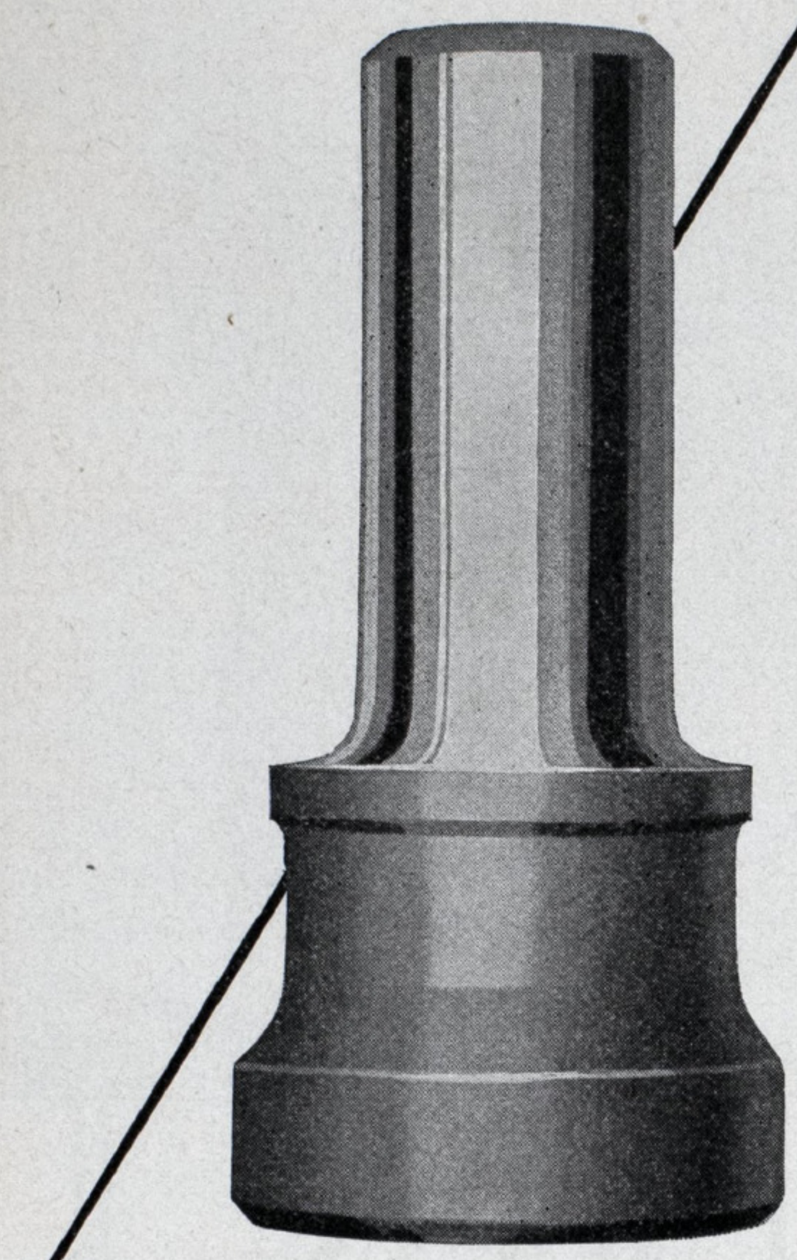
THE ALLEN CORPORATION, Detroit, Michigan
Ventilation Specialists
1049 14th Street
Roof Ventilators — Electric Exhaust Fans — Fan Ventilators

ALLEN
TURBINE VENTILATORS

Marine Representatives.

Baltimore, Md., 105 E. Pleasant St., Plaza 4061
Boston, Mass., 79 Milk St. Hancock 4094
Chicago, Ill., 520 No. Michigan Ave. Whitehal 4700
Cleveland, Ohio, 924 Keith Bldg. Superior 1418
Detroit, Mich., 1050 Fourteenth St. Lafayette 1126
Houston, Texas, 404 Avondale, Lehigh 4787
Milwaukee, Wis., 123 Pittsburgh Ave., Broadway 8328
Mobile, Ala , 212 Masonic Bldg. Dexter 891
New York, N. Y., 165 Broadway Cortland 7-1590
Philadelphia, Penna., 102 N. Fifth St. Lombard 7290
San Francisco, California, 526 Market St. Sutter 1100
Seattle, Washington, 206 First Ave. S. Main 7260

THEY LAST LONGER



because they can be recupped oftener without annealing

WHEN a Rich Red Head Rivet Set needs recupping, just chuck it into a lathe and turn out the burr *cold*. No annealing is necessary —and you can recup a Rich Red Head many times more than ordinary rivet sets.

Send for a sample—stating the size and kind of shank. Test it against any other make of rivet sets you are now using. That will prove to you how much more you get for your money when you depend on Rich Red Heads.

RICH

RED HEAD
RIVET SETS

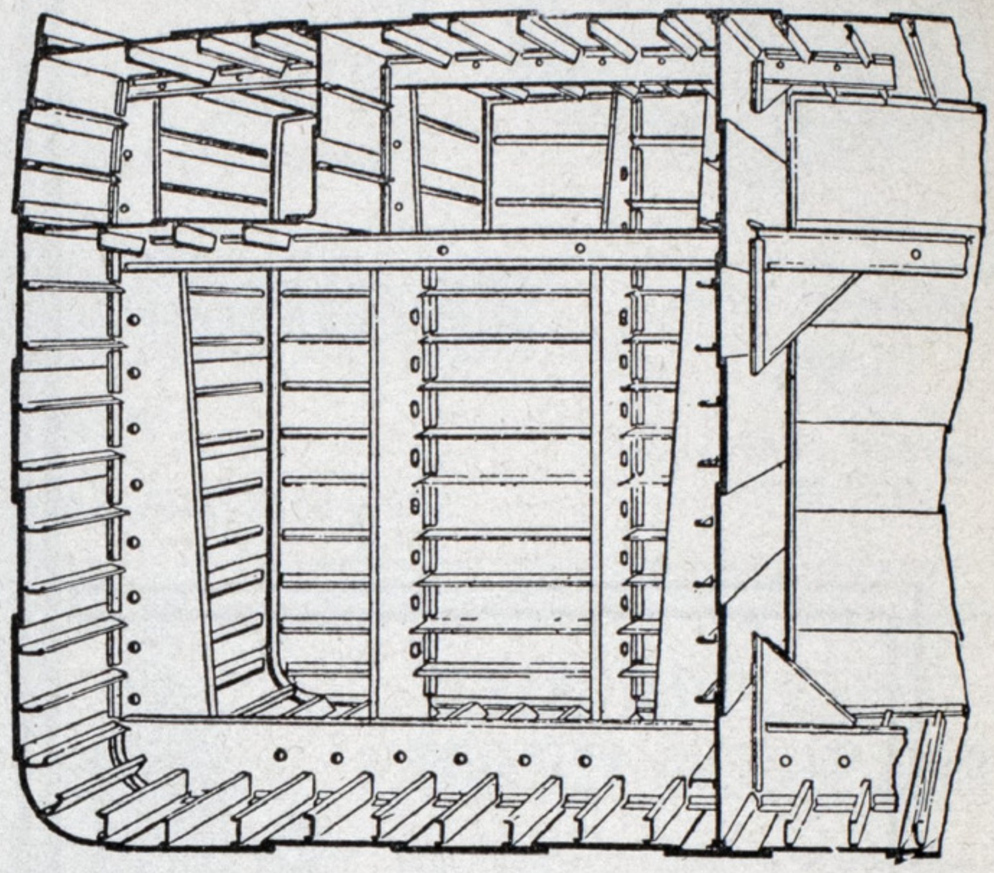
Manufactured by

WILCOX-RICH CORPORATION
DETROIT

Progress in Oil-Tank Ship Construction

The "Bracketless-System"

(PATENT)



Eliminates Bulkhead Brackets
Eliminates Bulkhead Leakage
Greatly Simplifies Construction
Greatly Reduces Cost of Damage Repairs
Greatly Reduces Cost of Cleaning Tanks
Substantially Increases the Longitudinal Strength
Beyond the Well-tried "Isherwood System"

Shipowners are advised to specify that plans and structural arrangements should be approved by

SIR JOSEPH W. ISHERWOOD & CO., Ltd.

17 BATTERY PLACE, NEW YORK
and 4, LLOYD'S AVENUE, LONDON, E. C. 3

Propeller Wheels and Blades

to fit any hub.

Sheriffs Manufacturing Co.
Established 1854
Milwaukee. Wis.

Oldman-Magee Boiler Works, Inc.

Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night
MARINE WORK A SPECIALTY ELECTRIC WELDING
Works: 36-40 Illinois Street - BUFFALO, N. Y.

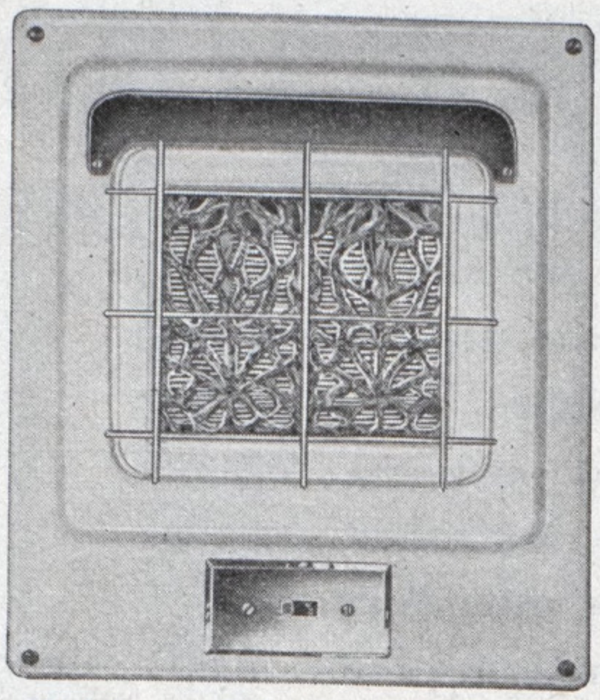
LANE LIFEBOATS

WERE SUPPLIED TO THE

BYRD ANTARCTIC EXPEDITION

C. M. Lane Lifeboat Co., Inc.
Brooklyn, N. Y.

INSTANT HEAT ALWAYS READY



Model	Volts	Rating
102A	110	1000 Watts

Dimensions

Frame: 14" Wide 16¼" High

Body: 11¾" Wide 11¾" High 4" Deep

Finishes—White, Ivory, Green and Orchid

Requires No. 12 Wire for connection.

At a snap of the switch your passengers can heat their staterooms to their liking.

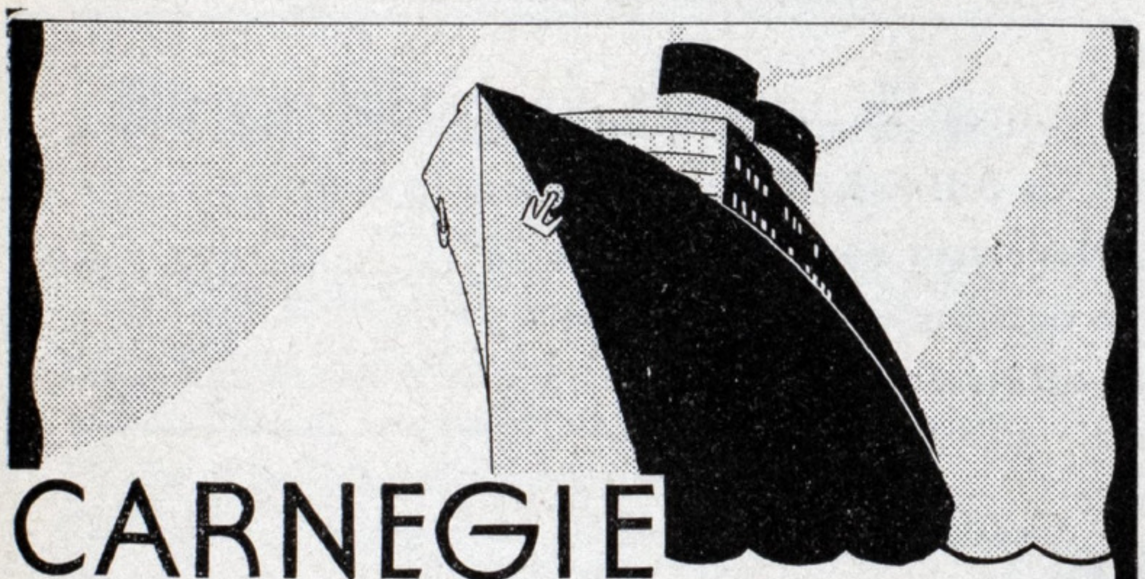
Add to the comfort of travel and increase traveling. ***Write for full details.***

THE RADIANT ELECTRIC HEATER

SUPERIOR MANUFACTURING COMPANY

CARNEGIE, PA.

*1



CARNEGIE SHIP BUILDING PRODUCTS

A complete line of structural steel sections for shipbuilding purposes, including Carnegie Beams with their wide, parallel flanges, shipbuilding channels and bulb angles, Carnegie Floor Plate in a raised pattern insuring long wear and easy cleaning, and rolled steel plates of every description.

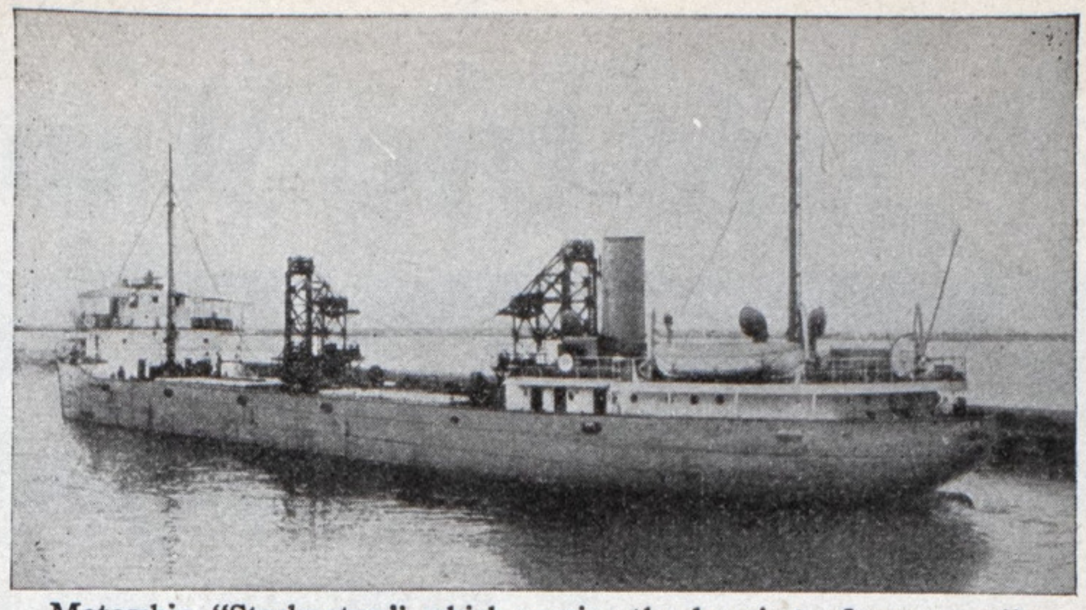
The name "Carnegie" has been identified with steel manufacture for nearly three-quarters of a century—a good name to look for on Steel.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

62



Motorship "Steelmotor," which carries the heaviest of cargo—rails, bars and other steel products—on the Great Lakes, through canals and on the St. Lawrence River. Also suitable for coastwise service.

McIntosh & Seymour Motorships

For Service on Inland Waterways

Oil Tankers

Amsterdam Socony
Schenectady Socony
Burlington Socony
Providence Socony
Hartford Socony
Troy Socony
Oswego [Socony
Rome Socony
Boston Socony

Two 460-hp. engines each

Texaco 146
One 400-hp. engine

J. H. Senior
One 460-hp. engine

Texaco 147

Bayonne
One 660-hp. engine

Ferry

Motor Princess
Two 800-hp. engines

Hydraulic Dredges

C. B. Harris
One 925-hp. engine

Raymond
One 1200 and two 850-hp. engines

Norfolk
One 1150 and two 500-hp. engines

Cargo Carriers

Steelvendor
Steelmotor
One 1000-hp. engine

Tug and Towing Vessels

Herbert Hoover
Two 1450-hp. engines

George Simons, Jr.
One 265-hp. engine

N. Y. Central No. 33
Two 533-hp. engines

DIESEL or Diesel-electric power is most logical for important inland vessels for these good reasons:—Incomparable fuel economy while running and no standby loss while idle; instant starting; quick maneuvering in the getaway, in sharp channel turns, in reversing, and in docking; small space for both power plant and fuel, the latter stored in otherwise useless places; minimum crew; quick and infrequent refueling; and above all, thorough dependability in any weather or climate.

McIntosh & Seymour Engines driving the vessels listed above, much larger units driving U. S. Shipping Board Motorships around the world, and units in various other ocean services offer convincing proof of thorough satisfaction to owner and operator.

Let our Engineers submit suggestions and performance data.

McIntosh & Seymour Corporation

Division of American Locomotive Company

Main Offices and Works: Auburn, N. Y.

New York City
30 Church St.

Jacksonville, Fla.
412 Bisbee Bldg.

Houston, Texas
2408 Esperson Bldg.

Kansas City, Mo.
1016 Baltimore Ave.

San Francisco
514 Matson Bldg.

McINTOSH & SEYMOUR DIESEL ENGINES

One Man in Forty—
and YOU *are the Man*

DID you ever stop to think that *you* are one of the comparatively small percentage of men whose "yes" or "no" really matters to American business?

Every morning 40,000,000 men start to work—in factories and mines, banks, railways, stores and other centers of industry or trade. Forty million men turn the wheels that keep America clothed, sheltered and fed.

But only one million of them make business decisions. Only one man in forty has the ability, the responsibility or the authority to say yes or no in business matters. Hence the *real* managing power of the country lies in the hands of these million men—less than one per cent of its total population.

As a member of this group—this controlling minority—you share an important responsibility—the triple responsibility of wisely liberal purchasing, of generous employment and of sane management to hasten the return of general prosperity.

• • •

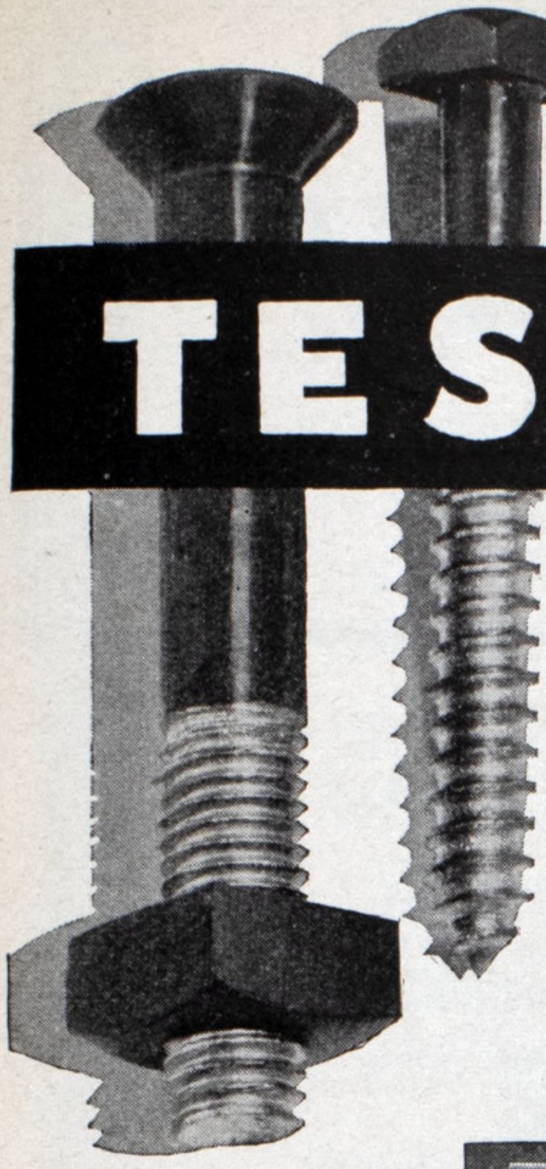
How, you ask, do we know that *you* are one of the million who make decisions for others to follow? Because men who read business papers are alert and eager for news of new plans, new methods, new equipment. That is *why* they are the men who control affairs.

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods, and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

MARINE REVIEW is a Member of

THE ASSOCIATED BUSINESS PAPERS, INC.

TWO-NINETY-FIVE MADISON AVENUE - NEW YORK CITY



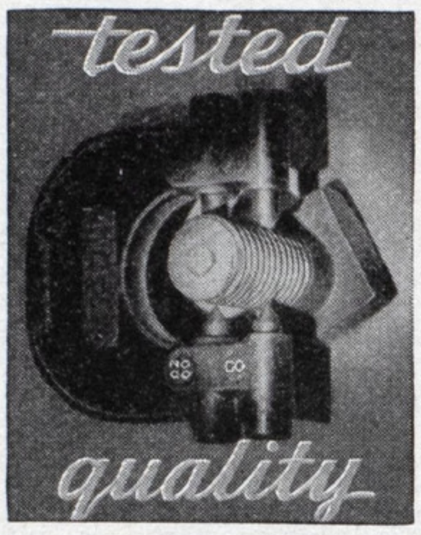
YOU SHOULD SELL

TESTED QUALITY

the Bolts and Nuts Specified by Careful Buyers...

More people are asking for Bolts and Nuts by name..."*Tested Quality*"

Every carton of Neely Bolts and Nuts displayed on your aisle tables or shelving ties right in with the nation wide advertising now being done on the product. You should be selling "*Tested Quality*." Write for complete details.



This symbol of "*Tested Quality*" appears on every container. It is the identifying mark of a super product.

NEELY NUT & BOLT CO.
PITTSBURGH, PA.

Star Brass Mfg. Co.

53 Oliver Street -::- Boston, Mass.

MANUFACTURERS OF

Accurate "Non-corrosive" Pressure and Recording Gauges, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine, Safety and Relief Valves for all pressures.

Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

HIGH GRADE THROUGHOUT
SPECIFY AND ORDER THE BEST.

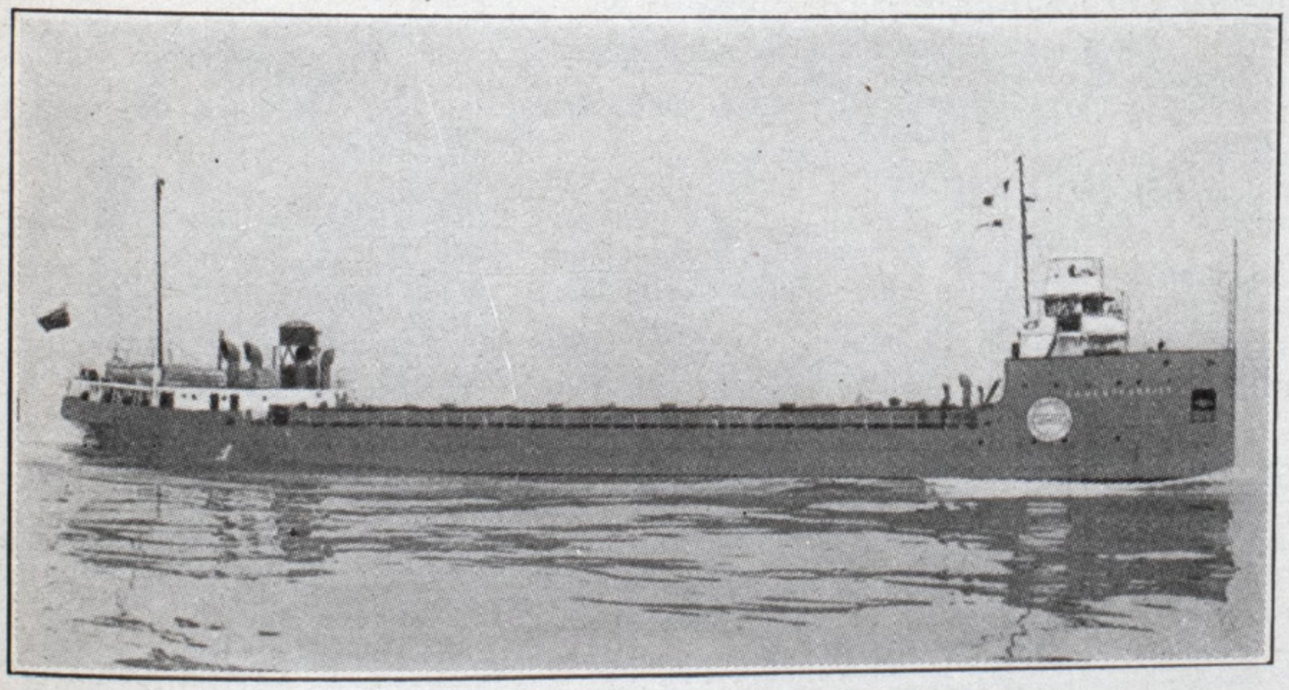
Branches: CHICAGO PITTSBURGH NEW YORK

PARACOIL Feed Water Heaters, Evaporators, Distillers, Lubricating Oil Coolers, etc., etc., are giving outstanding performance on the foremost American built ships—old and new.

DAVIS ENGINEERING CORP.
90 West St. New York, N. Y.

Paracoil
REG. U.S. PATENT OFFICE
Marine Equipment

THE PARACOIL PARADE
President Hoover
President Coolidge
Mariposa
Monterey
Lurline
Borinquen
G. Harrison Smith
Leviathan
Virginia
California
Pennsylvania
Waialeale
Hualalai
Montauk
Montana
Caracas
George Washington
President Harding
Pacific Sun
President Fillmore
Morro Castle
Santa Clara
City of New York
Itaska
Sebago
Saranac
etc., etc., etc.



Motorship

CEMENTKARRIER

Equipped with

Leathem D. Smith Self-unloading System

handling bulk cement
in Gulf of St. Lawrence.

LEATHEM D. SMITH DOCK CO.

20 N. Wacker Drive
Chicago, Ill.

Plant Location
Sturgeon Bay, Wis.

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

AIR COMPRESSORS—See COMPRESSORS

AIR PREHEATERS

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

ANEROIDS (Engine Room)

Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

ARMOR (Submarine)

Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

BABBITT METAL

Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

BARGES

Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BARGES (Steel)

American Bridge Co., 71 Broadway, New York City.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

BAROMETERS

Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

BATTERIES

Electric Storage Battery Co., The, 19th and Allegheny Sts., Philadelphia.

BEARING (Rubber)

Goodrich, B. F., Rubber Co., Akron, O.

BINNACLES

Ritchie, E. S., & Sons, Brookline, Mass.

BLOWERS (Flue)

American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.

BLOWERS (Motor Driven Ventilation)

Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

BLOWERS (Turbine Driven)

Westinghouse Elec. & Mfg. Co., S. Philadelphia, Pa.

BOATS (Steel and Wood)

Bethlehem Shipbuilding Corp., Ltd., Bethlehem. Pa.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

BOILERS

Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BOILERS (Marine)

Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
Oldman-Magee Boiler Works, Inc., 36-40 Illinois St., Buffalo, N. Y.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

BOILERS (Water Tube)

Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOLTS & NUTS

Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh, Pa.

BOOKS (Technical)

Penton Publishing Co., Cleveland, O.

BRAKES (Electric)

Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

BROKERS (Vessel)

Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.
Farley, Edward P., & Co., Inc., 11 Broadway, New York City.

BUNKER FUEL OIL—See FUEL OIL

BURNERS (Oil)—See OIL BURNING EQUIPMENT

CABLES

Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

CALKING COTTON

Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

CAPSTANS

Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

CAR FLOATS

American Bridge Co., 71 Broadway, New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

CASTINGS

Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
Standard Motor Construction Co., 184 Whiton St.. Jersey City, N. J.

COMPASSES

Ritchie, E. S., & Sons, Brookline, Mass.

COMPASSES (Gyro)

Sperry Gyroscope Co., The, Brooklyn, N. Y.

COMPRESSORS

Brunswick-Kroeschell Co., New Brunswick, N. J.

CONDENSERS

Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Great Lakes Engineering Works, River Rouge, Mich.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

CONTROLLERS (Electric)

Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

CONVEYORS (Portable)

Clark Tructractor Co., Battle Creek, Mich.

CORDAGE

Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

DECKING COVERING

Abestolith Mfg. Co., 1 Madison Ave., New York City.
Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

DEPTH FINDERS

Submarine Signal Co., 160 State St., Boston, Mass.

DIESEL ENGINES—See ENGINES (Diesel)

DIESEL FUEL OIL—See FUEL OIL

DISTILLING APPARATUS

Griscom-Russell Co., 285 Madison Ave., New York City.

DIVING APPARATUS

Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

DRAFT (Artificial and Mechanical for Boilers)

American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Great Lakes Engineering Works, River Rouge, Mich.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

DREDGING MACHINERY

Great Lakes Engineering Works, River Rouge, Mich.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

DRY DOCKS

American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Shipbuilding Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.

DYNAMOS

General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ECONOMIZERS

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

EJECTORS (Ash)

Great Lakes Engineering Works, River Rouge, Mich.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ENGINE SPEED INDICATORS

Sperry Gyroscope Co., The, Brooklyn, N. Y.

ENGINEERS (Marine, Mechanical and Consulting)

Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.
Great Lakes Engineering Works, River Rouge, Mich.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks, Inc., 11 Broadway, New York City.

ENGINES

Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

ENGINES (Diesel)

Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
McIntosh & Seymour Corp., Auburn, N. Y.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

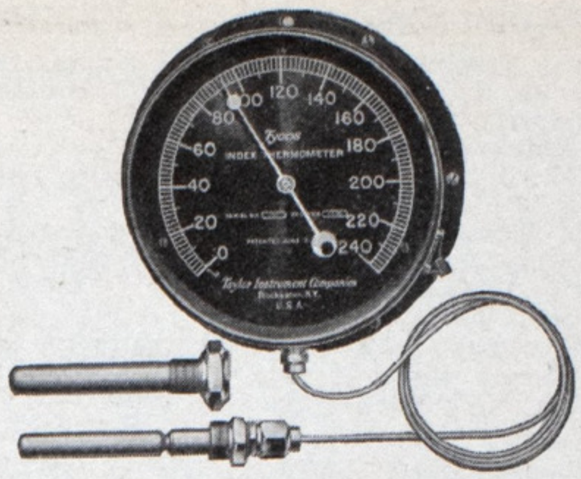
ENGINES (Internal Combustion)

Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.

ENGINES (Marine)

American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
McIntosh & Seymour Corp., Auburn, N. Y.

For Superheat Temperatures Use a *Tycos* Index Thermometer

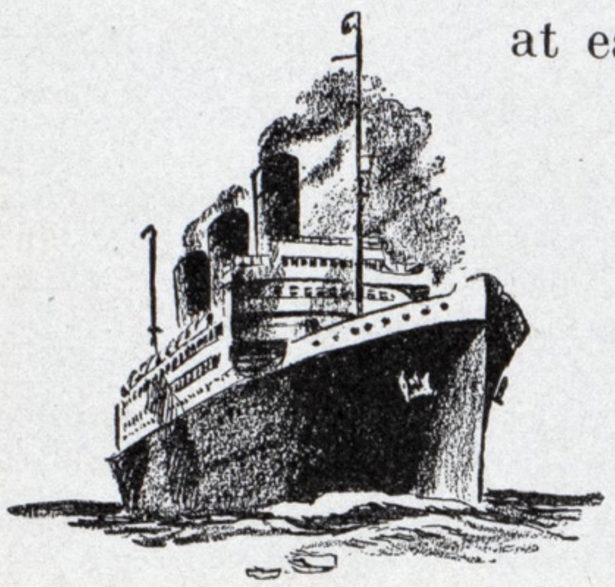


***Tycos* Index Thermometer**

Tycos Index Thermometers are accurate, dependable and easy to read. With the bulb placed in the steam main close to the engines or turbines, and the dial on the engine room instrument board, the engineer can tell at a glance his superheated steam temperature.

This makes it possible to keep an accurate check on the superheaters and valve adjustments.

Use *Tycos* Industrial Thermometers also to check individual super heaters. They should be installed at each superheater outlet.



Taylor Instrument Companies

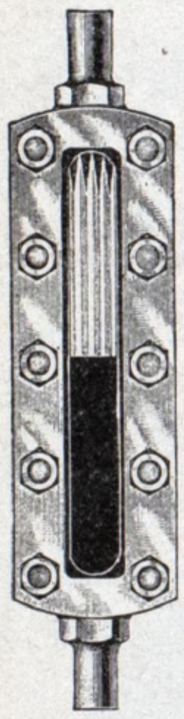
ROCHESTER, N. Y., U. S. A.

In Canada
Taylor Instrument Companies
of Canada, Ltd., Toronto

In Great Britain
Short & Mason, Ltd.
London, E-17, England

Tycos ***Instruments for Marine Use***

REFLEX WATER GAGES



Used on all types of boilers by all the Principal Navies of the world

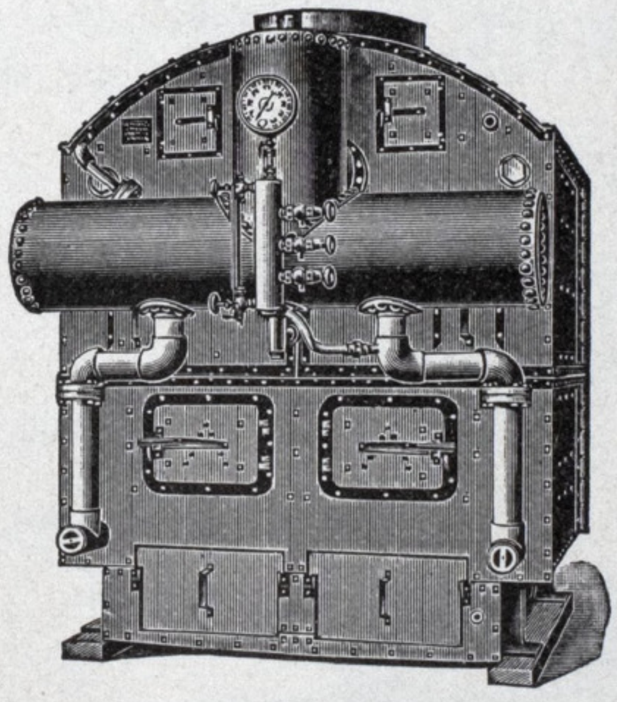
"The Water Shows Black"

ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with **WATER** the Reflex Gage always appears **BLACK.** When empty it instantly shows **WHITE.** No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

MANUFACTURED BY THE
JERGUSON GAGE & VALVE CO.
WINTER HILL, SOMERVILLE, MASS.



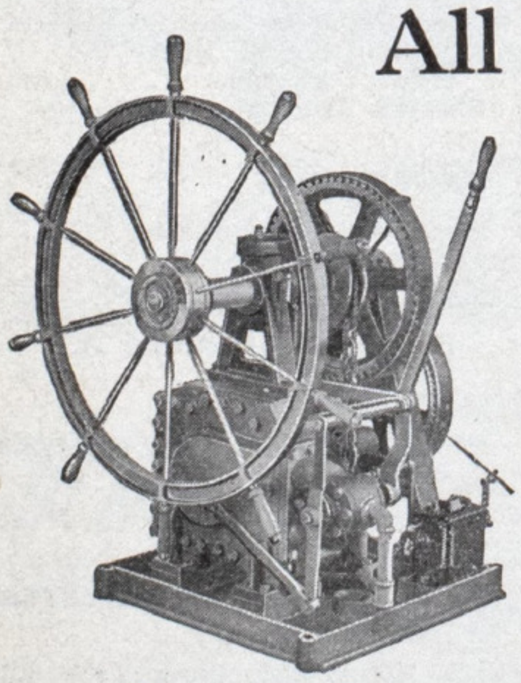
Almy Water Tube Boiler Co.

Builders of Sectional Water Tube Boilers for all types of vessels

Providence, R. I. U. S. A.

CATALOGUE FREE

All Over the Lakes They're Using Dake's

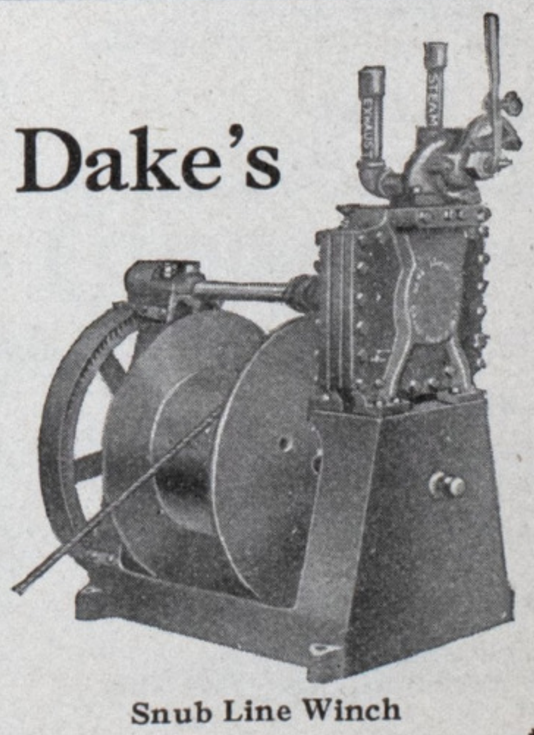


"CS" Steering Gear

Go into any port of consequence on the Great Lakes and you will find vessels using DAKE Steering Gears, Capstans, Windlasses or other auxiliaries. Ask the owners and you will find they give efficient dependable service, with the least expense for upkeep. DAKE Auxiliaries are all simple of construction and very compact. They require less space and very little attention. Write for information on any auxiliaries you are interested in.

Steering Gears, Capstans (hand and steam) Anchor Windlasses, Stage Hoists, Snub Line Winches, Spud Lifters, Net Lifters and Marine Castings.

Dake Engine Co., GRAND HAVEN, MICHIGAN



Snub Line Winch

ENGINES (Marine) Cont.

Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
New York Shipbuilding Co., Camden, N. J.
Sturtevant, B. F., Co., Inc., Hyde Park, Boston, Mass.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks Inc., 11 Broadway, New York City.

ENGINES (Oil)

Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Standard Motor Construction Co., 184 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

ENGINES (Steam, Steering)

Dake Engine Co., Grand Haven, Mich.

ENGINES (Vertical, Enclosed, Self Oiling)

Troy Engine & Machine Co., Troy, Pa.

EUROPEAN STEAMSHIP LINES (Passenger and Freight)

Hamburg-American Line, 39 Broadway, New York City.

EVAPORATORS

Griscom-Russell Co., 285 Madison Ave., New York City.

FANS

Diehl Mfg. Co., Elizabethport, N. J.

FANS (Electric)

General Electric Co., Schenectady, N. Y.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

FEED WATER REGULATORS

Babcock & Wilcox Co., 85 Liberty St., New York City.

FIRE BRICK

Babcock & Wilcox Co., The, 85 Liberty St., New York City.

FIRE PROTECTION EQUIPMENT

Garrison Fire Detecting System, Inc., 307 Fifth Ave., New York

FLOORING

Abestolith Mfg. Co., 1 Madison Ave., New York City.
Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

FLOOR PLATES

Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

FORGINGS (Upset)

Neely Nut & Bolt Co., 2101 Wharton St., Pittsburgh, Pa.

FOUNDERS

American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co., Camden, N. J.

FREIGHT SERVICE

Hamburg-American Line, 39 Broadway, New York City.

FUEL OIL

Vacuum Oil Co., 61 Broadway, New York City.

GAGES (Water)

Jerguson Gage & Valve Co., Somerville, Mass.

GALLEY RANGES

Stamford Foundry Co., Stamford, Conn.

GAUGES (Pressure, Vacuum)

Taylor Instrument Co's., 90 Ames St., Rochester, N. Y.

GEARS (Electric)

General Electric Co., Schenectady, N. Y.

GEARS (Marine Equipment)

Westinghouse Electric & Mfg. Co., So. Philadelphia. Pa.

GENERATING SETS

General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.

GENERATING SETS (Direct Connected)

Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

GENERATORS

Diehl Mfg. Co., Elizabethport, N. J.
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

GREASE

Vacuum Oil Co., 61 Broadway, New York City.

GREASE (Launching)

Vacuum Oil Co., 61 Broadway, New York City.

GYRO-PILOT (Automatic Steering)

Sperry Gyroscope Co., The, Brooklyn, N. Y.

HAWSERS (Manila)

Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

HEATERS (Electric)

Superior Mfg. Co., The, Gregg St., Carnegie, Pa.

HEATERS AND PURIFIERS (Feed Water)

Davis Engineering Co., 90 West St., New York City.
Griscom-Russell Co., 285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

HEATING EQUIPMENT

Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

HEATING STOVES

Stamford Foundry Co., Stamford, Conn.

HOISTING ENGINES

Hyde Windlass Co., Bath, Me.

HOISTS (Air)

American Shipbuilding Co., Foot of W. 54th St., Cleveland.

ICE MACHINES—See REFRIGERATING MACHINERY

INDICATORS (Direction & Revolution)

Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Helm Angle)

Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Speed)

Sperry Gyroscope Co., The, Brooklyn, N. Y.

INSURANCE (Marine)

Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc)

General Electric Co., Schenectady, N. Y.

LIFEBOATS

Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

LIFESAVING EQUIPMENT

Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT

General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

LUBRICATING OIL

Vacuum Oil Co., 61 Broadway, New York City.

MACHINERY (Marine)

American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Cooper-Bessemer Corp., The, Mt. Vernon, Ohio.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.

MACHINES (Sounding)

Submarine Signal Co., 160 State St., Boston, Mass.

MACHINISTS

American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
New York Shipbuilding Co., Camden, N. J.

MAGNETS (Lifting)

Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE RAILWAY BUILDERS

Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.

METERS (Gas & Air)

Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

MOTOR GENERATOR SETS

General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

MOTORS

Diehl Mfg. Co., Elizabethport, N. J.

MOTORS (Electric)

General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS

Ritchie. E. S., & Sons, Brookline, Mass.
Sperry Gyroscope Co., The, Brooklyn, N. Y.

NAVIGATING INSTRUMENTS

White, Kelvin & Wilfrid O., Co., 112 State St., Boston, Mass.

OAKUM (Marine, Rope, Packing, Plumbago)

Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

OIL BURNING EQUIPMENT

Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

OIL FOR ALL PURPOSES (Marine)

Vacuum Oil Co., 61 Broadway, New York City.

PASSENGER SERVICE

Hamburg-American Line, 39 Broadway, New York City.

POWDERED COAL BURNERS

Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

PROPELLER BLADES AND HUBS

Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS

American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLERS

Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry-Dock Co., 90 Broad St., New York City.

PULVERIZED COAL BURNERS

Todd Shipyards Corp., 25 Broadway, New York City.

PULVERIZED COAL SYSTEMS

Todd Shipyards Corp., 25 Broadway, New York City.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

Yacht owners and ship owners *insist on good dry docks*

More and more the owners of yachts and ships are insisting upon good dry docks.

Crandall Railway Dry Docks are good. They are backed by seventy-five years of design and experience. Crandall Dry Docks give better service—that means better business—that means more profits for Crandall Dry Dock owners.

Literature upon request.

THE CRANDALL ENGINEERING COMPANY

Cambridge, Massachusetts, U.S.A.

DEAN BROS.

MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex
Piston Type & Plunger

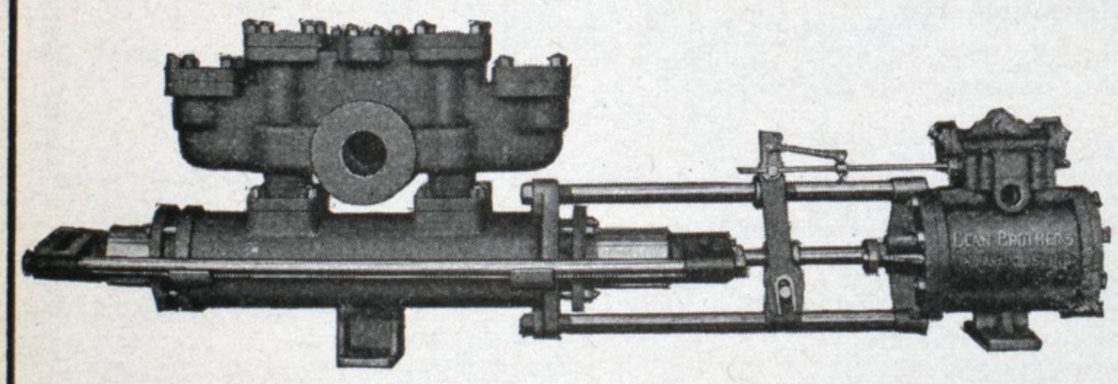


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

ESTABLISHED 1869

DEAN BROS. COMPANY

MANUFACTURERS OF PUMPING MACHINERY FOR ALL PURPOSES

323 WEST TENTH ST.

INDIANAPOLIS IND.

FIBORE
(FIBRE CORE)

MANILA ROPE

Patented June 23, 1925; Oct. 20, 1925; Aug. 3, 1926

STRONGER

EASIER TO HANDLE

MORE ELASTIC

MORE DURABLE

WHITLOCK CORDAGE COMPANY

46 South Street
New York

Factory and Warehouses
Jersey City, N. J.

Branches
Chicago, Boston, Kansas City *and* Houston

PUMPS
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Great Lakes Engineering Works,
River Rouge, Mich.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Ballast)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Bilge)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Boiler Feed)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Direct Acting)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Fuel Oil)
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

PUMPS (Power)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Steam)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc.,
Warren, Mass.

PUMPS (Vacuum)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

PYROMETERS (Diesel Engine)
Taylor Instrument Co's.,
90 Ames St., Rochester, N. Y.

RAFTS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St.,
Brooklyn, N. Y.

RAILWAY DRY DOCKS
Crandall Engineering Co., The,
134 Main St., Cambridge, Mass.

RANGES
Stamford Foundry Co.,
Stamford, Conn.

REFRIGERATING MACHINERY
Brunswick-Kroeschell Co.,
New Brunswick, N. J.

REPAIRS
Maryland Dry Dock Co.,
Baltimore, Md.

REPAIRS (Electric)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REPAIRS (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Charleston Dry Dock & Machine Co.,
Charleston, S. C.
Chicago Shipbuilding Co.,
So. Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.,
11 Broadway, New York City.

REPAIRS (Turbine)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REVOLUTION COUNTERS
Sperry Gyroscope Co.,
Brooklyn, N. Y.

RIVETS
Neely Nut & Bolt Co., 2101
Wharton St., Pittsburgh, Pa.

RIVET SETS
Wilcox-Rich Corp.,
9771 French Rd., Detroit, Mich.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

ROPE (Transmission)
Columbian Rope Co.,
Auburn, N. Y.

ROPE OAKUM
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

RUBBER TILE
Selby, Battersby & Co.,
33rd & Arch Sts., Philadelphia.

RUST PREVENTATIVE (Oil)
Vacuum Oil Co., 61 Broadway,
New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.

SEARCHLIGHTS
General Electric Co.,
Schenectady, N. Y.

SEARCHLIGHTS (High Intensity)
Sperry Gyroscope Co., The,
Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
Sperry Gyroscope Co., The,
Brooklyn, N. Y.

SEPARATORS (Oil)
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.

SHIPBUILDERS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Charleston Dry Dock & Machine Co.,
Charleston, S. C.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works,
River Rouge, Mich.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Maryland Dry Dock Co.,
Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.
11 Broadway, New York City.

SHIPBUILDING SYSTEMS
Isherwood, J. W., & Co., Ltd.,
17 Battery Place, New York City.

SHIP STABILIZERS
Sperry Gyroscope Co., The,
Brooklyn, N. Y.

SIGNALS (Submarine)
Submarine Signal Co.,
160 State St., Boston, Mass.

SOUNDING MACHINES
Submarine Signal Co.,
160 State St., Boston, Mass.

SPUN OAKUM
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

STEAMSHIP LINES
(Passenger and Freight)
Hamburg-American Lines,
39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

STEAMSHIP COMPANIES (Lake Passenger & Freight)
Cleveland & Buffalo Transit Co.,
The, E. 9th St. Pier, Cleveland.

STEAM TRAPS
Davis Engineering Co.,
90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEEL TANKS
Brunswick-Kroeschell Co.,
New Brunswick, N. J.

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING GEARS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STOKERS
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

STORAGE BATTERIES—See BATTERIES

STOVES
Stamford Foundry Co.,
Stamford, Conn.

STRAINERS (Oil)
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

SUPERHEATERS
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

SWITCHBOARDS
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

TELEMOTORS
Hyde Windlass Co., Bath, Me.

THERMOMETERS (Temperature, Recording)
Taylor Instrument Co's.,
90 Ames St., Rochester, N. Y.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

TRACTORS
Clark Tructractor Co.,
Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRUCKS
Clark Tructractor Co.,
Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TRUCKS (Dump)
Clark Tructractor Co.,
Battle Creek, Mich.

TURBINES (Electric)
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Steam)
DeLaval Steam Turbine Co.,
Trenton, N. J.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TWINE AND ROPE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

VENTILATING EQUIPMENT
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.

VENTILATORS
Allen Corp.,
1040 14th St., Detroit, Mich.

WATER COOLERS
General Electric Co.,
Schenectady, N. Y.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co.,
285 Madison Ave., New York City.

WELDERS (Electric Arc)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

WHISTLES
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

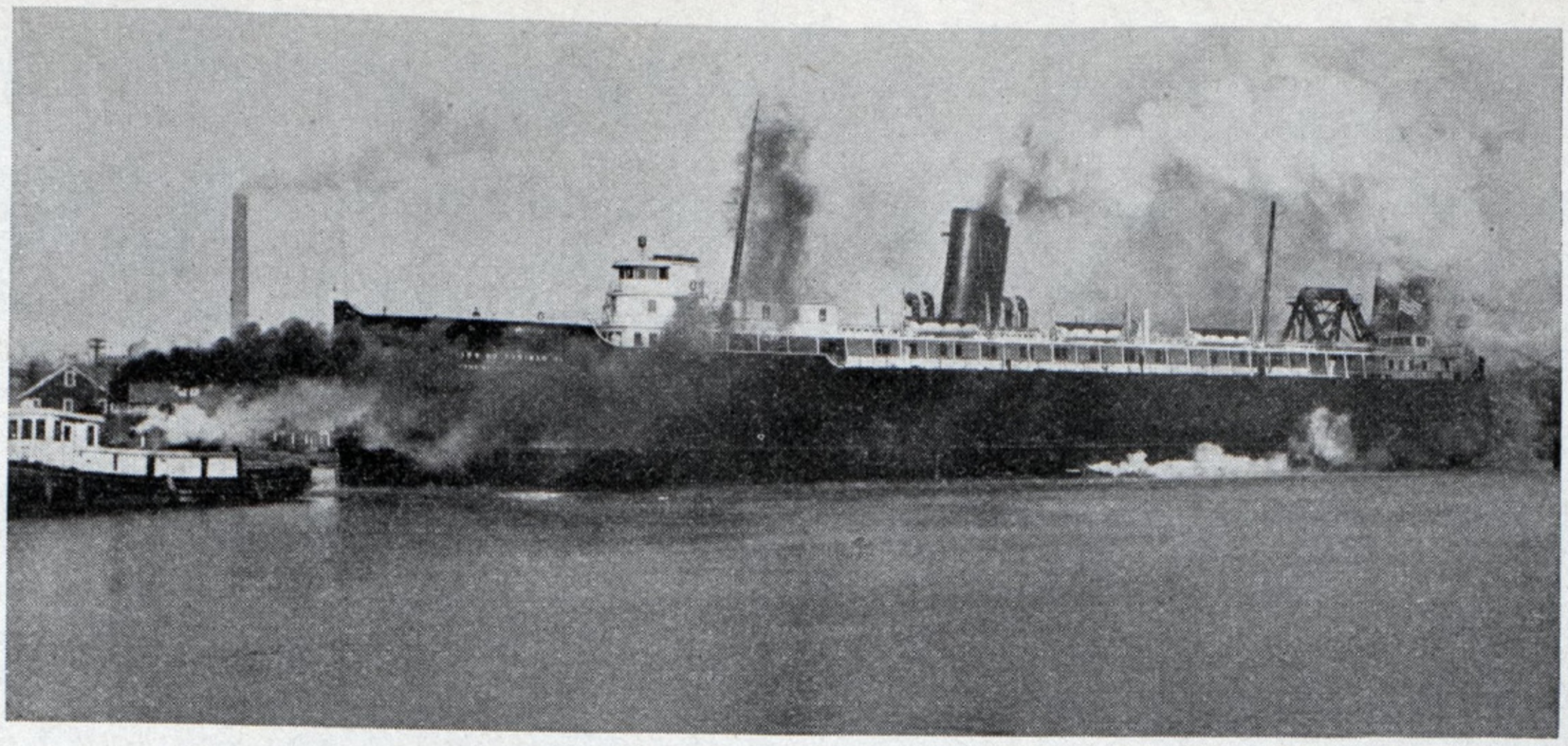
WINCHES
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dake Engine Co.,
Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDLASSES
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Dake Engine Co.,
Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)
Kearfoot Engineering Co.,
117 Liberty St., New York City.

WORKBOATS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



HERE IS THE CITY OF SAGINAW 31, the turbo electric drive carferry built by us for the Pere Marquette Railway Company. When it comes to designing and building vessels our engineering organization, skilled workmen, and modern facilities guarantee satisfaction to the customer.

We design and build steel passenger and freight vessels, carferries, oil tankers, sand suckers, lighters, dredges, yachts, fire boats, tugs, derricks, scows, marine engines and boilers. At this plant you will find excellent facilities, including a 600′ steel floating dry dock, for ship, engine and boiler repairs.

MANITOWOC SHIPBUILDING CORPORATION
MANITOWOC, WISCONSIN

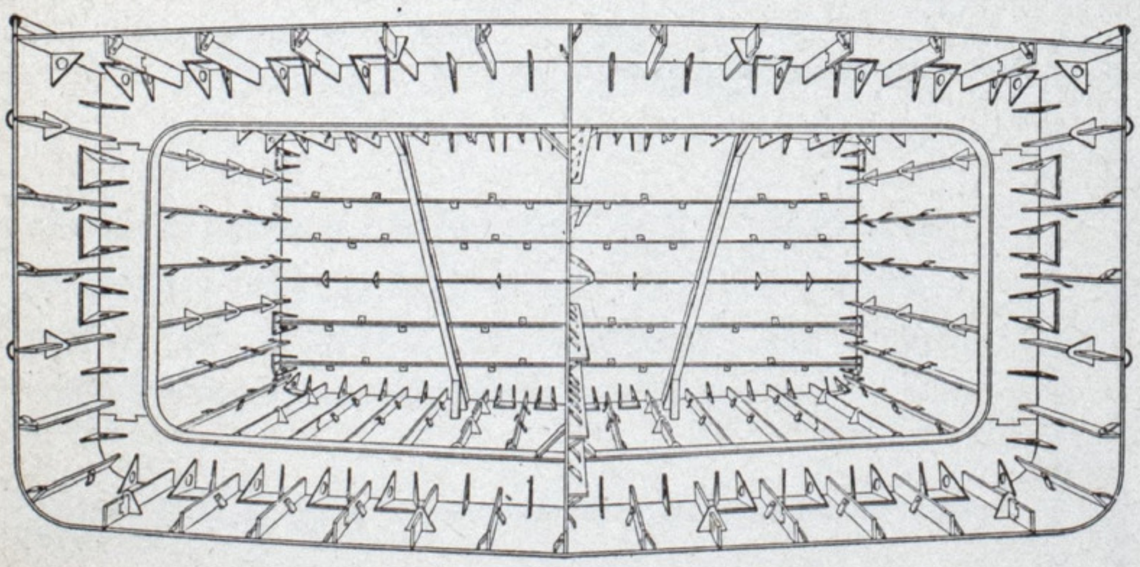
GRISCOM-RUSSELL

Evaporators—Feed Water Heaters—Extraction Steam Heaters—Generator Air Coolers—Lubricating Oil Coolers—Steam, Air and Oil Separators — Filters — Strainers—Expansion Joints
Described in bulletins which will be sent on request
THE GRISCOM-RUSSELL COMPANY 285 Madison Avenue, NEW YORK
CHICAGO: 20 North Wacker Drive

Kelvin & Wilfrid O. White Co.
112 State Street, Boston
Ship Compasses
Navigational Equipment
Contracts a Specialty
New York and Montreal

ANDREW J. MORSE & SON, Inc.
221 High Street BOSTON, MASS.
Established 1837
Diving Apparatus and Submarine Armor
Fire Protection Equipment
The Invincible Nozzle
Catalogues on request

Reduces Construction Costs—Increases Carrying Capacity



Midship Section of Transverse and Bulkhead
Marine Boilers—Barges—Scows—Lighters General Repairs to Wooden and Steel Vessels—Two Marine Railways

Used in All Types of Ship Construction Including Barges, River Steamers and Dredges
Does away entirely with Angles, Shapes, Rivets and Bolts.

Richard F. Smith
Patent Applied for
Lock Notch Welded System
Charleston Dry Dock & Machine Company
Charleston, S. C.

Sole Licensees for Smith System—Correspondence invited with Shipyards desiring to construct Vessels on this System —Reasonable Royalties.

Classified Advertisements

For Sale and Miscellaneous—Help and Positions Wanted

For Sale and Miscellaneous Advertisements
10c per word—minimum advertisements—$3.00

Six words must be added for box address.

To insure insertion, advertisements must reach us by the 10th of the month preceding date of issue.

Help Wanted Advertisements
6c per word—minimum advertisement—$3.00

Position Wanted Advertisements
4c per word—minimum advertisement—$1.00

Please have remittance accompany order.

Position Wanted

ELECTRICAL ENGINEER ASSISTANT, OPEN for immediate position. 20 years experience in planning, construction and supervision of switch boards, ships fixtures and layout of wiring for both Salt and Fresh water vessels. Address Box No. 422, MARINE REVIEW, Cleveland, Ohio.

MASTER AVAILABLE FOR STEAMER, Yacht, or Tug—I have Master's License for any part Great Lakes and St. Lawrence River to Montreal—20 years experience as Master—Charges reasonable. Sidney LeBean, Hammond, N. Y.

AT LIBERTY FOR COMING SEASON. First class steward, all around cook. On the Great Lakes since 1905. Go anywhere. Wife and waitress. Bill DePuy, Elk's Club, Tulsa, Okla.

For Sale

FOR SALE: TWO HIGH PRESSURE LA- France fire pumps. 17" steam 10" water 12" stroke, with stand pipes, for fire tug. W. J. Hingston, 86 Springville Avenue, Buffalo, N. Y.

FOR SALE—2 SCOWS 26 FT. BY 135 FT. H. Riley, Foot West Genesee St., Buffalo, N. Y.

Wanted

WANTED

4 Three Furnace Scotch Boilers about 13' Diameter by 12' Long. Working Pressure 160 lbs. Fitted with oil burning Furnace Fronts. Purchasing Agent, Eastern SS Lines, Inc., Boston, Mass.

For Sale

FOR SALE
WOODEN TOW BARGE PESHTIGO
201' Keel 37' Beam 12' Depth.
O. W. Blodgett, Bay City, Mich.

FOR SALE: 12" SUCTION DREDGE, 72 FT. ladder, and agitator, dredge 40 ft. deep. Canal Barge 115' x 22" Cap. 500 tons. W. J. Hingston, 86 Springville Avenue, Buffalo, N. Y.

FOR SALE
WOODEN TOW BARGE N. C. HOLLAND
187' Keel 32' Beam 11' 2" Depth.
O. W. Blodgett, Bay City, Mich.

TO OUR SUBSCRIBERS

The classified section of MARINE REVIEW is for your convenience—its value is proving worthwhile to everyone who uses it to buy and sell.

If you want to buy or sell ships or marine equipment—need a man for your organization—make it known to the entire marine industry through the use of classified advertising in MARINE REVIEW.

Mail copy for your advertisement in the July issue today, so it reaches us before June 20.

TRAVEL
Via
Lake Erie

New Low Fares and Auto Rates

Between CLEVELAND and BUFFALO
May 1st to Nov. 1st, leaving, each way at 9:00 P. M., arriving 7:30 A. M. (E. S. T.)

$4.50 One Way :-: $7.50 Round Trip

Autos carried to June 15th and after Sept. 15th, $5.00 any size car. Summer rates, only $6.50 and $7.50

Between CLEVELAND and PORT STANLEY, CANADA
June 27th to Sept. 9th. Leave Cleveland at 11:59 P. M. arrive Port Stanley 6:00 A. M. Leave there 4:30 P. M. arrive Cleveland 9:30 P. M.

$3.00 One Way :-: $5.00 Round Trip
Autos Carried, $4.50 up

Write us or ask your local Ticket or Tourist Agent for our new 32-page illustrated Vacation Booklet, on All-Expense Tours

The Cleveland and Buffalo Transit Co.
East 9th Street Pier **Cleveland, Ohio**

SAMSON SPOT
Log Lines

Trade Mark Reg. U.S. Pat. Off.

Smooth, tough and durable; no adulterating material to stiffen it and decrease strength and durability. Solid braided of extra quality cotton yarn. Uniform in size and quality. Easily identified by the colored spots, our trade mark.

We also manufacture flag halyards, lead lines, tiller rope; solid braided cotton cord in all sizes for various marine uses. Ask for catalog and samples.

SAMSON CORDAGE WORKS
89 Broad Street Boston, Mass.

Edward P. Farley & Co.
Incorporated
Steamship Owners, Agents and Brokers
11 Broadway—New York

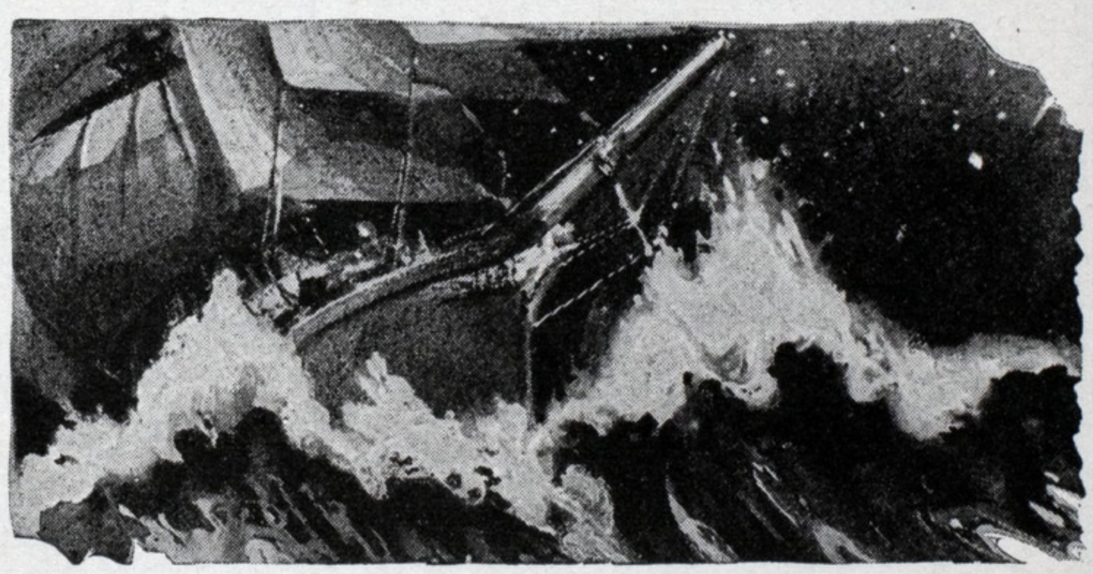
John J. Boland **Adam E. Cornelius**

BOLAND & CORNELIUS
VESSEL OWNERS AND BROKERS
Marine Insurance Agents
Marine Trust Building **BUFFALO, N. Y.**

Ship For Sale?

If you have a passenger ship, freighter, tanker, tug or any other floating property or marine equipment for sale advertise it in Marine Review.

The rate is $3.00 for a minimum advertisement of 30 words. Additional words, 10c each.



"Who hath desired the sea?—
the immense and contemptuous surges?
The shudder, the stumble, the swerve,
as the star-splitting bowsprit emerges?"
RUDYARD KIPLING

DOWN plunges her nose, buried in stormy seas. Waves pound her sides, and break swirling over decks. Lee scuppers under. Yet on she goes, riding the waves without fear, deck and side seams right-caulked with

STRATFORD OAKUM

Sailormen like Stratford Oakum—they know it and use it. And so did their granddads, nearly a hundred years ago. They knew, as you will know, that there is only one oakum to use, and it is Stratford.

Do not accept a substitute, there is none "just as good."

George Stratford Oakum Company
JERSEY CITY, NEW JERSEY
Also manufacturers of cotton wiping waste

2*

Index To Advertisers

Abestolith Mfg. Co..... 66
Allen Corp..... 67
Almy Water Tube Boiler Co... 73
American Ship Building Co... 6, 7

Babcock & Wilcox Co..... 63
Bethlehem Shipbuilding Corp., Ltd..... 16
Boland & Cornelius..... 79
Brunswick-Kroeschell Co..... 61

Carnegie Steel Company..... 69
Charleston Dry Dock & Machine Co..... 77
Clark Tructractor Co..... 55
Cleveland & Buffalo Transit Co..... 79
Columbian Rope Co..... 17
Cooper-Bessemer Corp., The.. 9
Crandall Engineering Co., The 75

Dake Engine Co..... 73
Davis Engineering Corporation 71
Dean Brothers Co..... 75
DeLaval Steam Turbine Co... 13
Diehl Mfg. Co..... 3

Electric Storage Battery Co. .....Front Cover, 59
Elwell-Parker Electric Co., The 57

Farley, Edward P. & Co., Inc. 79
Federal Shipbuilding & Dry Dock Co..... 14

Garrison Fire Detecting Co. .....Inside Front Cover
General Electric Co..... 15
Great Lakes Engineering Wks. 18
Griscom-Russell Co., The.... 77

Hamburg-American Line..... 66
Hyde Windlass Co.....Back Cover

Isherwood, Sir Joseph W., & Co., Ltd..... 68

Jerguson Gage & Valve Co.... 73

Kelvin & Wilfrid O. White Co. 77

Lane, C. M. Lifeboat Co., Inc. 68

McIntosh & Seymour Corp.... 69
Manitowoc Shipbuilding Corp. 77
Maryland Dry Dock Co..... 66
Morse, Andrew J., & Son, Inc. 77

Neely Nut & Bolt Co..... 71
Newport News Shipbuilding & Dry Dock Co. Inside Back Cover
New York Shipbuilding Co... 8

Oldman-Magee Boiler Works, Inc..... 68

Ritchie, E. S. & Sons..... 66

Samson Cordage Works..... 79
Sheriffs Manufacturing Co.... 68
Smith, Leathem D., Dock Co. 71
Stamford Foundry Co..... 66
Star Brass Mfg. Co..... 71
Stratford, Geo., Oakum Co.... 79
Sturtevant, B. F., Co. Back Cover
Sun Shipbuilding & Dry Dock Co..... 12
Superior Mfg. Co..... 69

Taylor Instrument Co.'s..... 73

United Dry Docks, Inc..... 81

Vacuum Oil Co..... 4

Warren Steam Pump Co..... 65
Westinghouse Electric & Mfg. Co..... 82
White, Kelvin & Wilfrid O., Co. 77
Wilcox-Rich Corp..... 68
Whitlock Cordage Co..... 75

Important Offer to Tugboat Owners

Would you like a Guarantee to Increase Hawser Pull and Maneuverability if

UNITED GIVES IT TO YOU GRATIS

▼ ▼ ▼

Nimble tugs that deliver full performance are more than ever essential these days—a condition which, ordinarily, costs money to bring about. UNITED SERVICE, however, now offers to owners of harbor craft a new feature of its research facilities which involves neither cost nor obligation yet has great value to the operator: a specifically guaranteed increase in hawser pull and greater maneuverability. This guarantee is based upon exact tests with precision instruments that record the tractive efficiency of the boat with your present propeller and provide the data for an

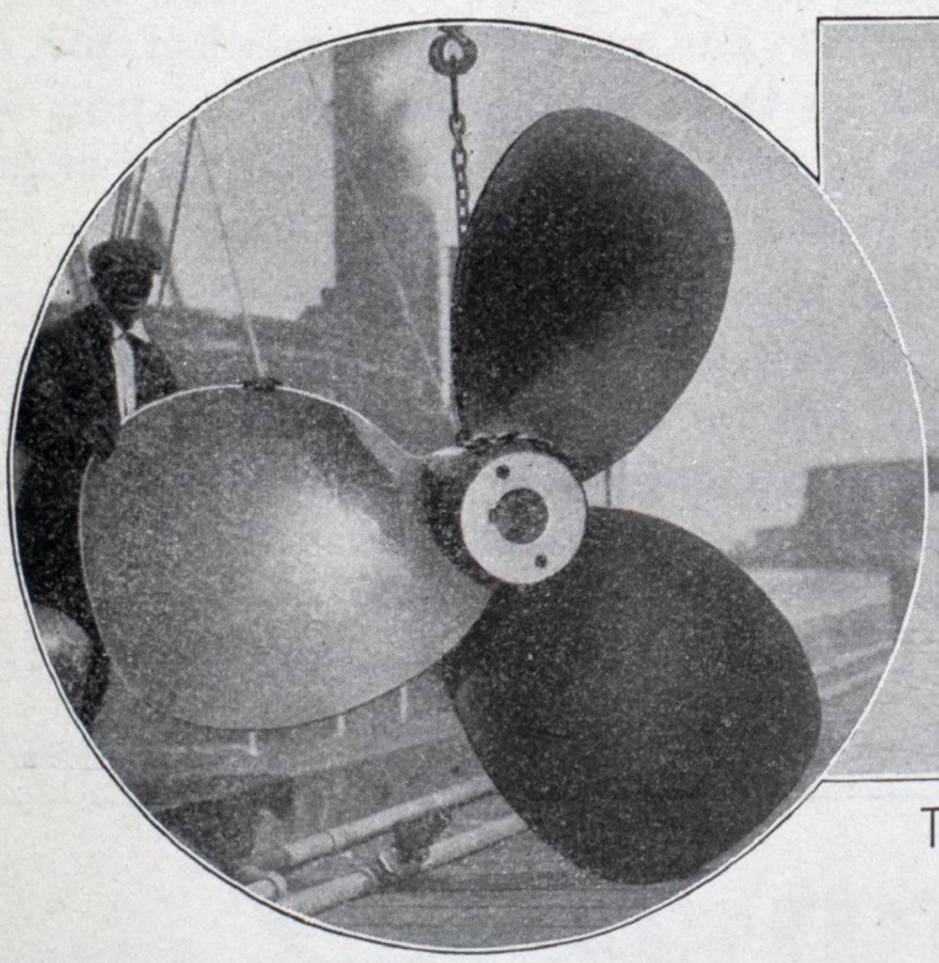
Individually Designed **United Precision Propeller** **Greater Pull Quicker Handling**

Tell us when you can spare a boat for a couple of hours, as many others already have done; we'll try to suit your convenience. This does not mean that you must buy a wheel from us now or ever; it simply means that, when next you need a wheel, you will decide whether you want definitely increased pull and quicker handling, with no premium price. Mr. Millard Moore is arranging the schedules for these tests; why not phone him?

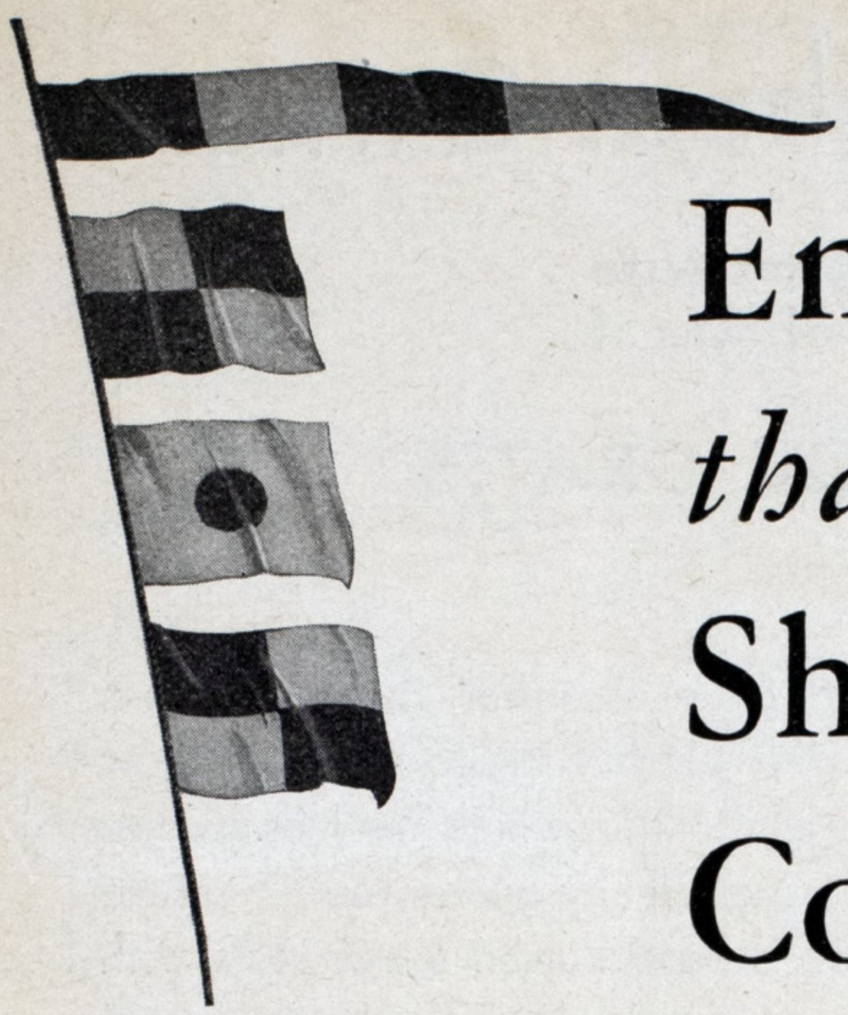
▼ ▼ ▼

11 Broadway, New York **UNITED DRY DOCKS** **Telephone: Digby 4-0500**

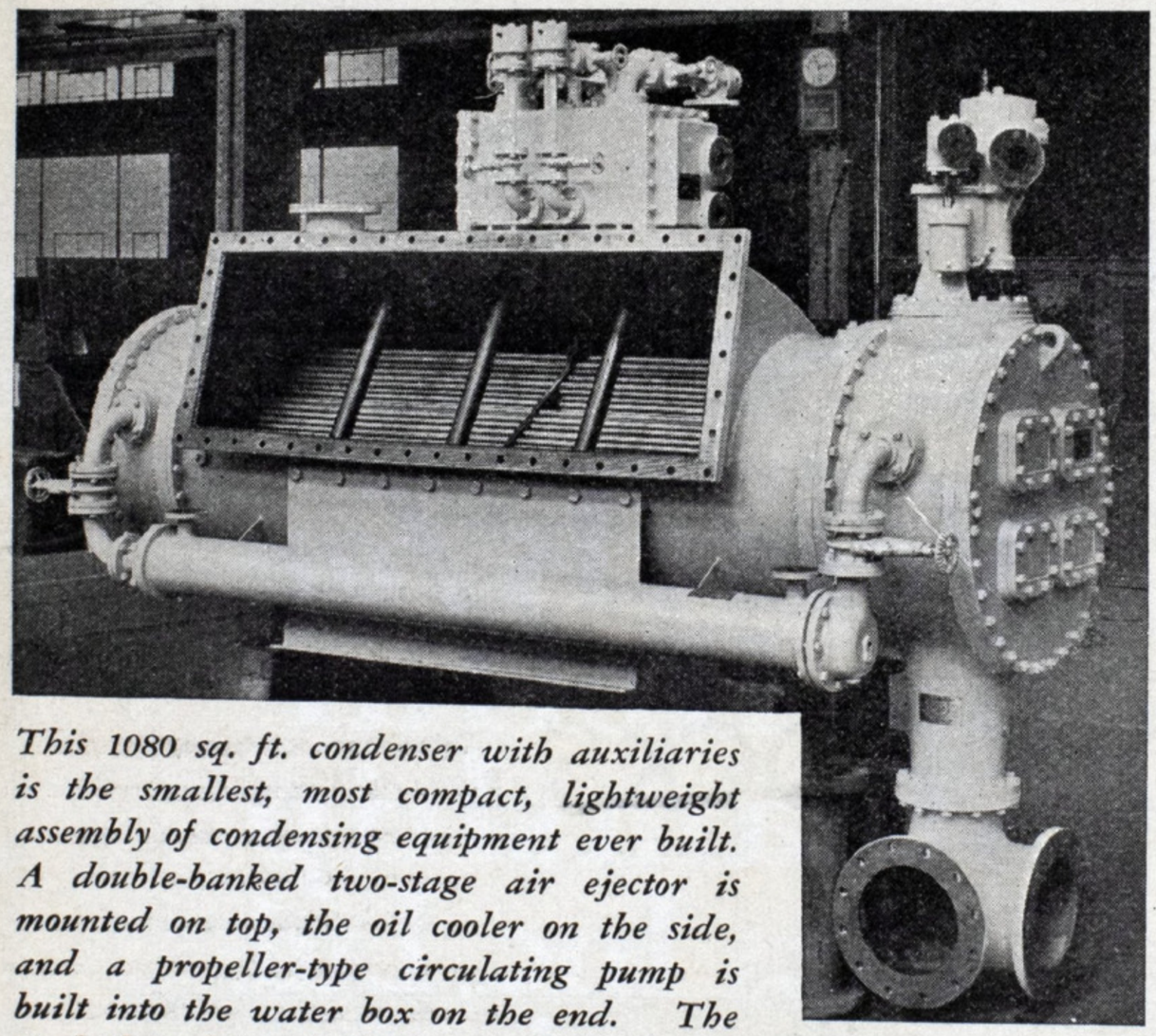
INCORPORATED



Tug "K. WHITTELSEY" gains 15% more hawser pull and 50 degrees lower exhaust temperature with its United Precision Propeller



Engineering *that Cuts* Shipbuilding Costs . . .



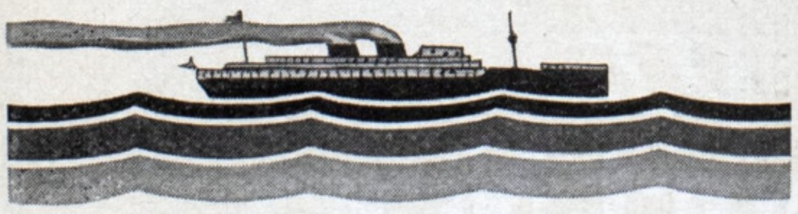
This 1080 sq. ft. condenser with auxiliaries is the smallest, most compact, lightweight assembly of condensing equipment ever built. A double-banked two-stage air ejector is mounted on top, the oil cooler on the side, and a propeller-type circulating pump is built into the water box on the end. The steel plate shown in front, one of the flexible supports, eliminates the necessity of an expansion joint.

SAVINGS in ship construction are of vital interest to the owner and operator, because carrying charges of such major importance as depreciation, insurance and interest are reduced accordingly.

Maintaining their progressive record in marine engineering, Westinghouse engineers have again contributed toward making ships less costly to build, operate and maintain.

The accompanying illustration shows a new and unique arrangement of condenser, air ejector, circulating pump, and oil cooler, which is a distinct advance in the building of better ships at less cost. This combined unit is installed in the first geared-turbine tugboat in the world now in operation on the Great Lakes. The unit eliminates not only the foundation for itself, but also for each of its three auxiliaries. Construction cost is still further lowered because of the minimum amount of piping required and the absence of an expansion joint.

Maintenance will be low because every part is 100 per cent accessible. There are fewer pipe joints and but one rotating element. Operation will be cheaper because this apparatus, both in design and arrangement, is inherently more efficient than any other equipment for the same purpose.



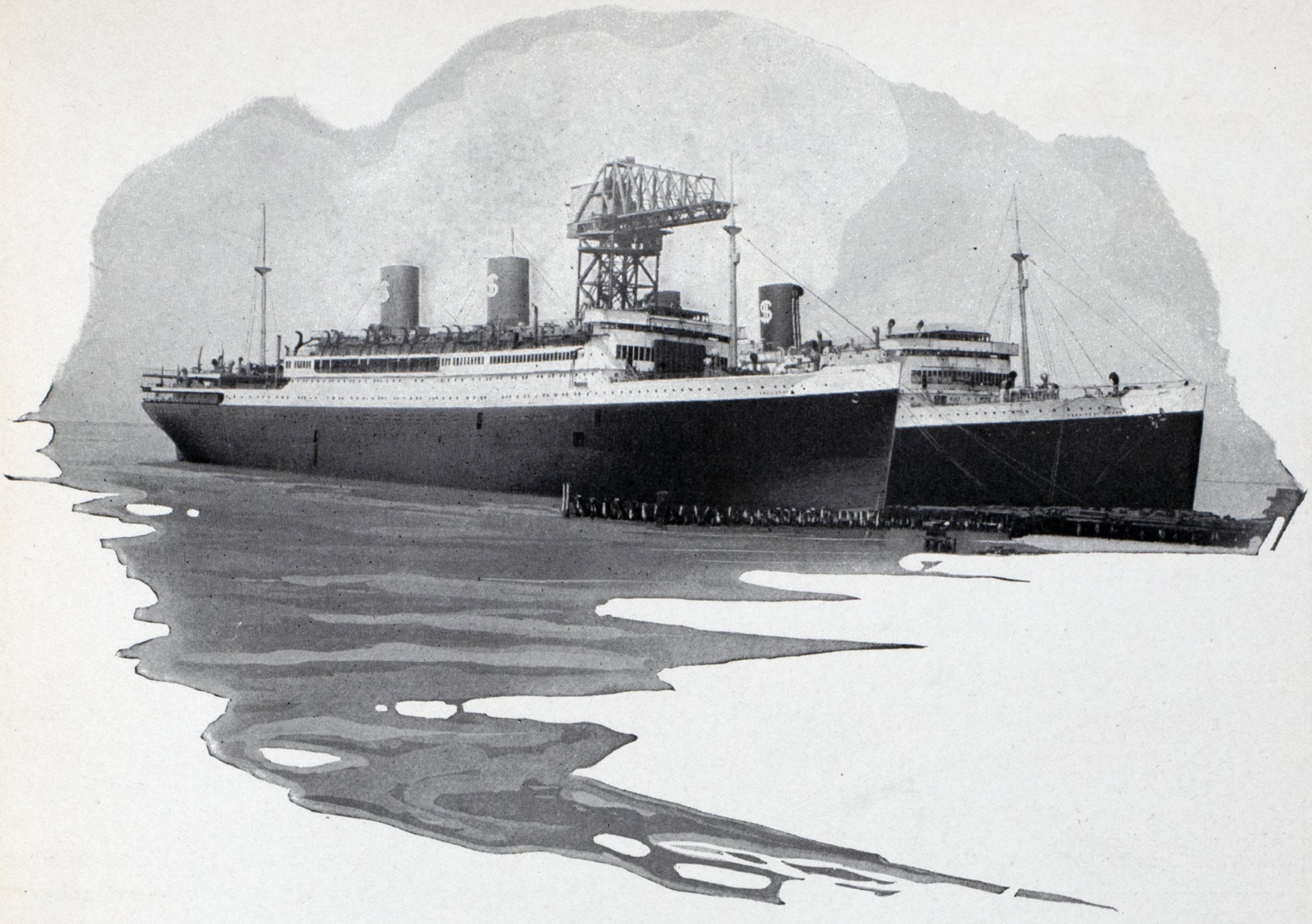
Maintain American Shipping by Patronizing American Ships

Westinghouse

WESTINGHOUSE ELECTRIC

T 31826

TUNE IN THE WESTINGHOUSE PROGRAM OVER KDKA, KYW, WBZ AND ASSOCIATED N. B. C. STATIONS SUNDAY EVENINGS.



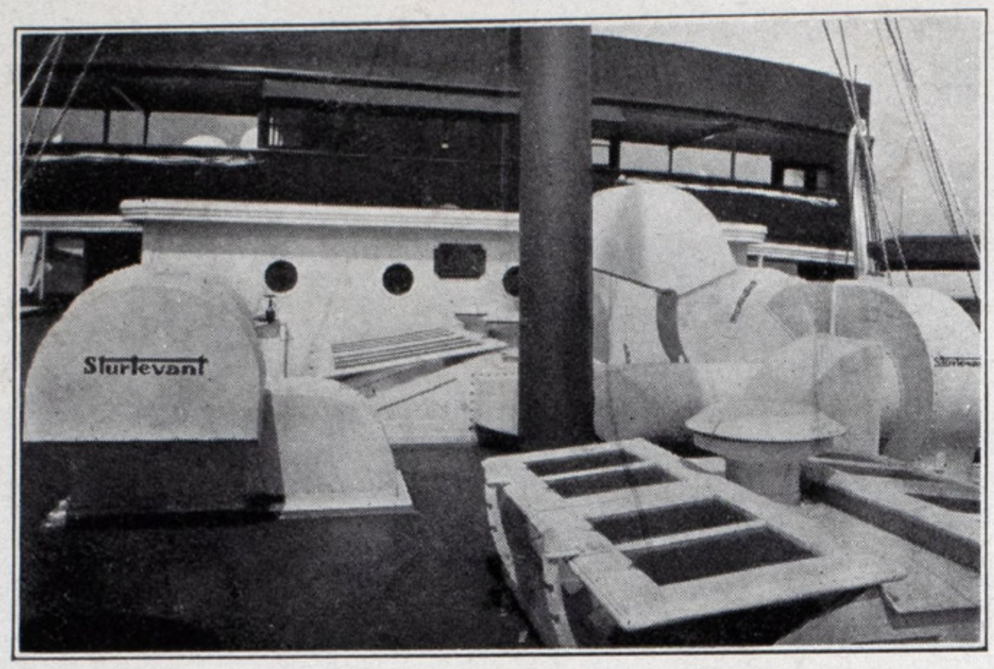
Ships of Character

Vessels *for* the Dollar Steamship Lines Inc., Ltd. *nearing* completion *at* Newport News

Newport News Ship Building *and* Drydock Company

NEWPORT NEWS VA. 90 BROAD STREET N.Y.C.

No Smoke—No Odors



We all know that there is nothing that makes a good meal set better than a good after dinner smoke. Yet nothing will spoil a meal quite as quickly as to have someone near us smoke while we are eating.

If your ship is ventilated by Sturtevant Ventilating equipment, then the effort of your chefs is really appreciated, and your guests may smoke to their hearts content.

Just a line to our Marine Department will bring you complete information, and it will not obligate you in any way.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Sales Engineering Offices in Principal Cities

Sturtevant (REG·U·S·PAT·OFF·)

Marine Equipment

Heating and Ventilating Equipment—

Mechanical Draft Equipment—Turbines—Motors—Blowers—

Ventilating Sets—Heaters—Generating Sets—Exhausters

Gasoline and Steam Engines

If You Want The Best Specify

Hyde

S. S. "A. F. HARVEY" owned by Pittsburgh Steamship Co. and built by Great Lakes Engineering Works.

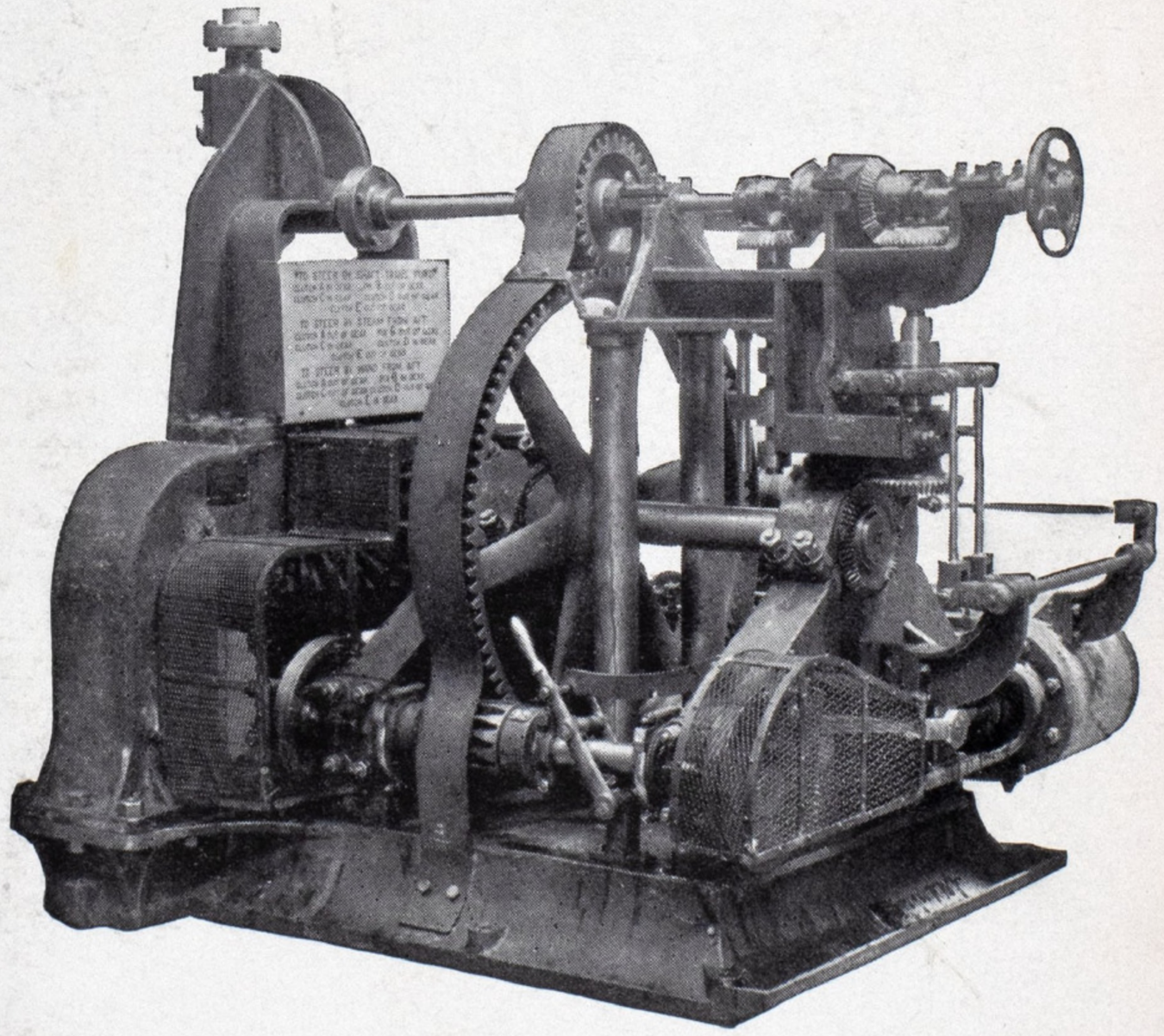
S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.

S. S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

These three fine new boats are all equipped with

Hyde

Quadrant Type Steering Gear
Spur Gear Windlass
Mooring Winches
Hatch Winches



HYDE Quadrant Type Steering Gear

Hyde Windlass Company

Bath, Maine